

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York.

Vol. XXIII: No. 1.

New York, Thursday, January 2, 1879.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

Gautier Steel Company, Limited, Johnstown, Penn.

The present depressed condition of the iron interest—a depression the extent of which is shown by constant and almost daily reports of stoppages, assignments and failures of our rolling mills, and which is

fires in which it is used. Bituminous coal is a necessity for rolling mill work, and although for some purposes anthracite may be substituted, yet to a certain extent all Eastern mills must be supplied with a softer and hotter fuel than hard coal, and that cannot be found east of the Alleghenies.

The new rolling mill of this company,

From the gradual growth of the iron business in this country, few rolling mills have an interior arrangement at all adapted to convenience in working, as the mills have in most cases increased to many times the size contemplated when they were built, the additions being made as necessity dictated. The consequence has been a conglomeration

passes through the rolls that bring it to the shears, which are placed by the side of another track, so that as the steel is cut it may be bended and loaded directly on the cars. A like arrangement is seen in the wire mill, by which coal and rods may be unloaded directly where wanted and the wire put on the cars where finished. A

double their capacity. As this had been previously contemplated, however, it could be carried out without impairing the efficiency of the arrangement. They make all grades and sizes of wire, and when finished this winter their mill will cover over two acres, a large part of which will consist of two stories. The galvanizing room will be 50 by

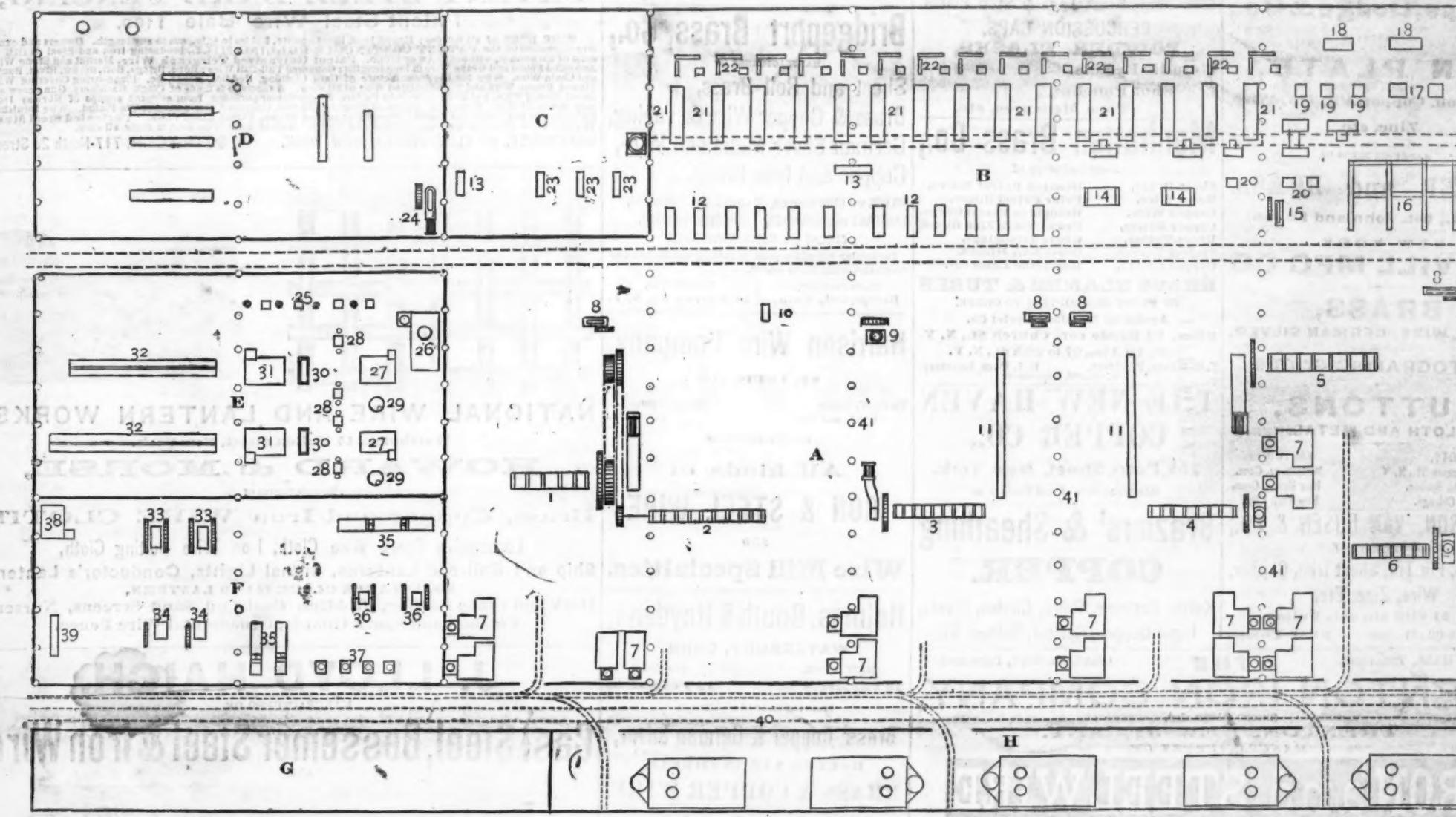


Fig. 1.—PLAN OF GAUTIER ROLLING MILL.

PLAN OF ROLLING MILL—Fig. 1.
A.—Rolling Mill.
B.—Spring Shop.
C.—Stock Room for Springs.
D.—Rake Shop.
E.—Finger Bar Shop.
F.—Compressor Shop and Shipping House.
G.—Boiler House.
H.—Bar Mill.
I.—Rod Mill.

probably even more deeply felt in Europe—has necessitated that every possible benefit consequent on abundant credit and careful management, should be utilized to the utmost.

The struggle for existence in the present fierce competition seems to require in addition that every possible advantage of location that could result in reduced freight rates to leading markets, and in cheapness of fuel, ore and supplies, and a plant arranged in the most approved way, with the best equipment for the work, should be possessed by the successful houses of the future. Their competitors, working at a constant disadvantage, are either compelled to sell at a continual loss or else permit the quality of the goods to deteriorate, which naturally leads to a not less disastrous result.

We have been led to these remarks by a consideration of the action of D. G. Gautier & Co., formerly of Jersey City, who, recognizing the fact that for the immediate future business must be conducted with a smaller profit than formerly, have moved their steel plant from its former situation, and selected a location which seems to them to offer facilities equal, if not in some respects superior, to that occupied by any rival house.

That one of the largest and most successful iron works of the country is in Johnstown, Pennsylvania, their new situation, may have served to some extent to convince them that no better point could have been chosen. Aside from this, however, a careful investigation of the advantages this town offers, must lead to a favorable conclusion as to its fitness. It is on the main line of the Pennsylvania Railroad, within easy distance of the large sea-coast cities; at the same time not widely separated from the markets of the West and South, and close to the river navigation of the Ohio, the great feeder of the Mississippi.

It is in a valley which was once largely filled by coal, which by the slowly working forces of nature has been washed away, leaving, however, in all the surrounding hills horizontal strata of coal, into the excavations in which railroad tracks penetrate, and from which locomotives bring the coal from the spot where mined directly to the

comprising also the spring shop and machinery for making hoes, rakes, teeth, and finishing finger bars, covers between two and three acres, being 455 feet long and 200 feet wide. It has seven trusses, each of 65 feet span, the girders and supports being entirely of iron and stone, together with which all possible precautions against fire have been

of trains of rolls and machinery, resulting in much extra expense and inconvenience. This result has seemed necessary for the reason above mentioned, but occasionally circumstances arise by which a mill can be erected on plans fully decided on in advance, and in which every portion of the mill is seen to be intended as part of a compact whole.

large portion of the work of this concern is steel for agricultural implements, plow steel, steel for mowers and reapers, cultivators, barrows, grain drills, &c., together with the manufacture of horse rake teeth, of which they made last year sufficient for 35,000 rakes, or half of all used in the United States and Canada, and steel finger or cutter

180 feet, the demand for that kind of wire for fencing and other purposes having largely increased within the past year. In addition to the rods that can be supplied by their own mill, they use all that can be rolled by the wire rod mill of the Cambria Iron Company, which is probably the most perfect ever constructed, it being able to successfully roll as small sizes as No. 7, 8 and even 9 gauge, and has a capacity of over 50 tons per day.

Few but those whose attention has been called to the matter realize the number of uses to which wire is put, from the tiny pin to the thousands of miles of ocean cable. As illustrations of the amount used may be instanced the massive suspension bridges, the lengths of telegraph wire and the wire used for binding grain. For this last purpose there will be used this year 1,000,000 miles of wire, all of which, before another season, will be cut up and disappear. It might also be almost literally said that the entire West is being fenced in with either plain or barbed wire. For the latter purpose the wire must be flexible, yet tough and strong, and should be in as long lengths as possible to avoid splicing. Their entire capacity will be over 50 tons of steel, 65 tons of wire and 200 pairs of carriage springs daily, and their future progress will be watched with interest by all engaged in similar lines.

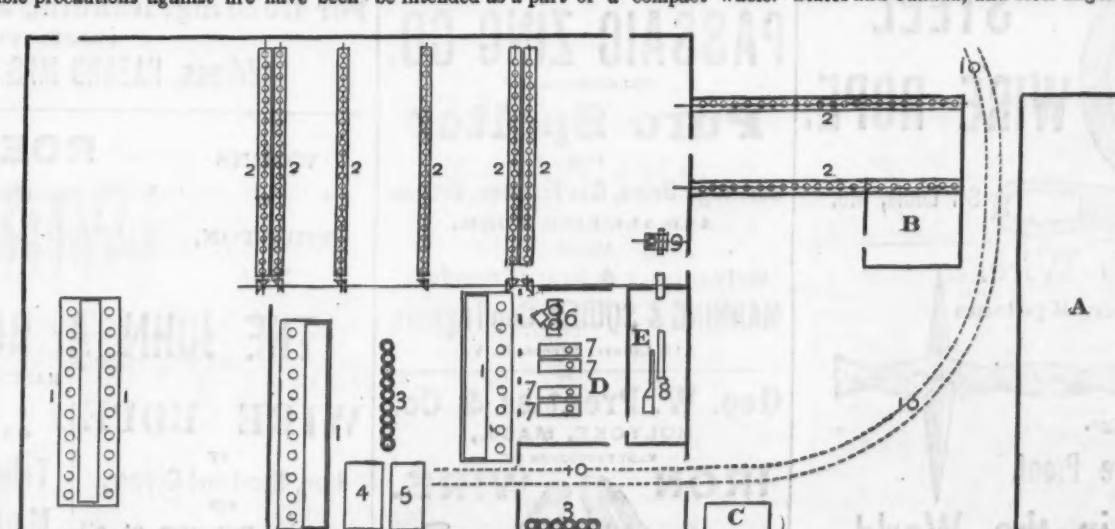


Fig. 2.—PLAN OF GAUTIER WIRE WORKS.
A.—Galvanizing and Tinning Shop.
B.—Machine Shop.
C.—Office.
D.—Boiler House.
E.—Engine House.

1.—Annealing Furnaces.
2.—Wire Drawing Benches.
3.—Cleaning Tubs.
4.—Wire Heating Furnace.
5.—Muffle Furnace.
6.—Vertical Corliss Boiler.
7.—Horizontal Tubular Boiler.
8.—33 inch x 60 inch Corliss Engine.
9.—18 inch x 20 inch Vertical Engine.
10.—Railroad.

taken. The rolling mill has 4 nine inch, 2 twelve and 2 twenty inch trains of rolls, run by independent engines, one round rolling machine, two heavy steam hammers, with boilers and fires in keeping, together with all the improvements that experience could suggest, either to increase the amount of the product or improve the quality or finish.

We present herewith a ground plan of the rolling mill and wire mill of the Gautier Company, in which it will be seen that the utmost convenience has been studied, and that almost no labor in removing stock from one part of the mill to another is needed. Cars may be switched from the Pennsylvania Railroad and unloaded directly beside the heating or melting fires. From there the steel

bars for mowers and reapers, of which they are the only manufacturers in America. They also manufacture tire spring and toe-calk steel, carriage and wagon springs. They have 14 fitting fires and 9 grindstones. Their wire mill was completed a few months ago, but the demand for wire assumed such proportions as to compel them to make additions, now nearly completed, that more than

Major Henry Howell, of Sarnia, Canada, is claimed to have invented a new process of refining petroleum without the agency of heat. A sample manufactured from American petroleum at 45 gravity is stated to be a very brilliant and white oil of 48 gravity and 122 fire test. The yield from the crude was 93 per cent. But the most extraordinary claim for this process is not merely that the means used are entirely mechanical, but also that there is no production of gasoline or benzine, and the entire product is standard white illuminating oil, far superior to the oil refined under old methods. This new process, if what is claimed for it be true, is just precisely what the producers have been looking for; but the probabilities are that the claims will not bear scientific investigation.

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SEE PAGE 9.

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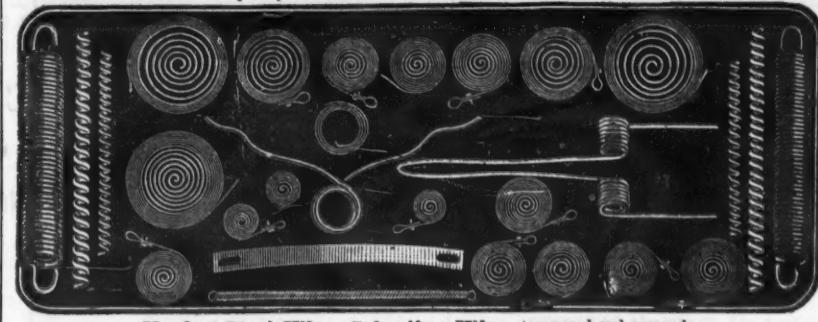
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Effect of Time and Sectional Cohesion
Upon the Rupture of Rolled Iron.

BY A. J. MOXHAM.

(Concluded.)

We will look at the bearing of our assumption on the matter of intermittent strain. Let us suppose a case in which a stress of say 25,000 lbs. per square inch, applied in a given time, has developed the limit of elasticity, with its accompanying elongation. Suppose a further stress of say 5000 lbs. per square inch added. The first effect will be that a further extension will occur, followed shortly in its flow by a reduction in sectional area. Suppose the stress to be taken off before the reduction in sectional area has taken up this increased elongation, what will occur? That part of the increased elongation not taken up by sectional flow may still be considered elastic; and yet upon relieving the iron of stress, the coefficient of elasticity being constant, this surplus of elastic elongation becomes part of the permanent set. To do this it must be maintained in a state of tension or destroyed by some force. The only power that seems to me available for this purpose is the inertia of the mass. If so, our assumption is further supported. Now we will suppose that the iron is at this stage subjected to fresh stress. We have produced a permanent distortion equal to that which 5000 lbs. per square inch above our assumed point of rupture (or 30,000 lbs. in all) is capable of effecting; less that amount of the same which is maintained *pro tem* by the inertia of the mass. Suppose that at the moment of relieving the stress, out of the 5000 lbs. say 3000 lbs. had produced permanent distortion, and 2000 lbs. were a measure of the surplus elongation, and that in the time that intervenes before the application of fresh stress, 1500 lbs. of the latter has been expended in overcoming the flow that has set in, leaving 500 lbs. balanced by the inertia of the mass opposing *pro tem*, further check to the flow. Now, in checking the flow that has set in, the 1500 lbs. has added to that extent to the permanent distortion; it cannot expend itself in this work and yet exist to detract from that distortion by restoring the mass to its first form. Upon the application of a new stress, before a change in the form can occur we must expend an amount equal to the 25,000 lbs. plus the amount that has produced permanent distortion, or 29,500 lbs. In other words, whereas 25,000 lbs. was before capable of producing an abnormal extension, it will take 29,500 lbs. to do so now, plus of course that amount necessary to overcome the fresh inertia developed by anything above that pressure.

Moreover, according to these views the increase in the elastic limit for the same differences of stress would vary with the extent to which the inertia of the mass opposes check to the backward flow at the time of the application of the new stress;

or it would, in other words, vary for the same iron as the time intervening between the application of the stresses to the extent of the permanent distortion due to the given difference of stress. In Experiment No. 1, sample F, the iron had been strained to 40,000 lbs., and after relieving same of stress had not been subjected to fresh stress for seven days. It will be seen that though the new limit of elasticity is not exactly defined, it is very close to the breaking point.

The permanent distortion alluded to may occur, according to these views, with or without a correspondingly proportionate decrease in area. The more ductile the iron the greater the decrease in area, and to this extent, as measured by the original area, the less would be the phenomenon of intermittent stress be developed. In very soft irons the reduction in area might even be so great as not to show it at all by this measure.

In sectional inertia two powers of resistance take part—the resisting power of each individual fiber, *per se*, to change of form, and the resisting power of the cohesion of each fiber with those surrounding it. It must be remembered that the latter, or cohesive inertia, can only be reached by overcoming the former. The resistance of cohesive inertia is only developed by the tendency of each fiber to reduce in area.

We would therefore expect that the more ductile an iron the greater the proportion borne by the power of cohesive inertia to that of fibrous inertia. We have an evidence of this in the greater reduction of the area of ductile iron, which we have seen to be due to the power of cohesion to curve the axis of each fiber from its normal position. *Vice versa*, the greater the stiffness of the iron the less is the cohesive inertia developed and the smaller the sectional area and extensibility for a given stress.

In a given iron the equation that seems to exist in the force expended to produce fracture by the development of either of the above tendencies is apparently here maintained, in that the force necessary to overcome the excessive cohesive inertia developed by ductility is compensated for by the fact that the greater this cohesion the greater is the sectional reduction in area.

In proportion to the increased force it calls into play does it permit the greater action of this force toward producing rupture by increasing the stress per square inch on the iron for constant additions of weight to the same.

This force—or rather the work done by the same—will, therefore, in a strain diagram, be measured by a line drawn parallel from the point marking the limit of elasticity to the base of such diagram, the ordinates to this abscissa being measures of the stress per square inch on the reducing sectional area at the given stresses, not, as usually drawn, on the original area of same.

I have attained close results by this method, but as yet my experience therewith is not sufficient to warrant me in speaking of it with absolute certainty.

We would expect, therefore, in accordance with the above views, that the greater the ductility the greater would be the amount of sectional rupture, and, moreover, the greater the after effect toward continuing that rupture of what we have termed the passive inertia, maintained by the mass after fracture.

In Experiment No. 2 we have seen this to be the case. In the following experiment the effect of both these elements have

been ascertained. The determinations were made in different parts of the same bar which had been previously fractured:

Experiment No. 3.

Samples taken were different portions of the same bar which had been fractured, taken only from the turned part of same.

Specific gravity.

Part of bar.	Sept. 23, '78.	Nov. 18, '78.	Pr. ct.

<tbl_r cells="4" ix="3" maxc

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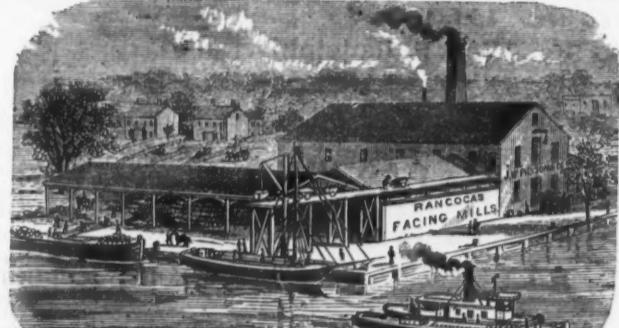
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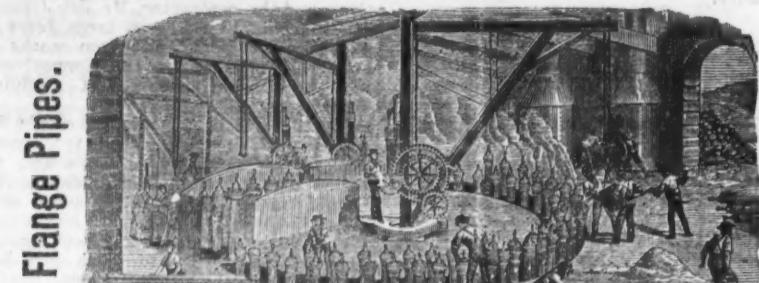
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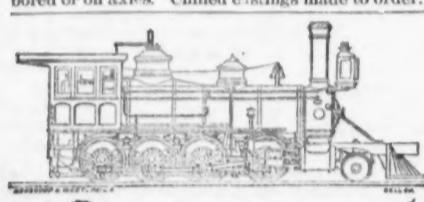
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**American Interests in Sheffield.**

Mr. Webster, U. S. Consul at Sheffield,
England, writes to the State Department as
follows:

The number of articles of American
manufacture and the quantities of agricultural
produce already imported into this
consular district are very large. A degree
of prejudice existed at first. It was said
that American implements would do well for a
time, but they would not last. That this state-
ment was wide of the truth is proved by the
testimony of large importers, who are doing an
increasing business. Still there may be
danger of allowing the quality of articles
made to sell abroad to depreciate, as com-
pared with the same that are designed for
the home market. Sharp and intelligent
critics are watching our productions, and
the great importance of keeping up the
quality of American articles for export to
the highest standard cannot be too strongly
urged. The English people have been ac-
customed to articles of a heavy make, but
our lighter wares, if really good, will win
their way to general favor.

There was a prejudice at first against
American hay forks. They were distrusted
as wanting in strength. But now that they
have been proved they are very much liked.
One firm here has sold over 2500 dozen of
them this season, and is having calls for
more than they are able to supply. Ameri-
can scythes and snathes are coming into use,
and a large trade in them is looked for next
year. The firm above named is doing a
good business in a great variety of Ameri-
can goods. The following are some of the
articles and quantities sold, viz.: 2145 dozen
locks, 14,676 iron planes, 1185 dozen box-
wood rules, 2952 dozen hat and coat hooks,
2250 dozen hammers, 372 dozen weighing
machines, 2520 screw wrenches, 230 dozen
saws, 600 dozen drawer pulls, 1680 dozen
auger bits, 753 axes, 4000 braces, 2800 fret-
work saws, 20 tons oil stones, 2400 dozen
axle pulleys, 32 dozen scythes, 250 dozen
snathes, rakes, glass cutters, &c., &c. Other
firms are engaged in the same line of
business, the aggregate of whose sales would
be several times the above amounts. One
dealer has imported goods to the amount of
£7000, consisting among other things of
locks, spokes and rims, hubs, brackets,
augers and bits, bench screws, tailors' shears,
sash fasteners, hammer and ax
handles, planes, spokeshaves, wrenches, hay
forks, axle and frame pulleys. American
manufacturers must, however, expect sharp
competition. Already some of the articles
above named are imitated here, at a cheaper
rate probably than they can be made in the
United States, and are sold as American.

The amount of fresh meat sold in Sheffield
during the last six months is 182,370 pounds.
The aggregate sold in this consular district
would undoubtedly reach 500,000 pounds.
It has given very general satisfaction. The
prejudice against it has almost entirely dis-
appeared, and arrangements are now making
to largely extend the sale, by a company
who are to open twelve new shops. The
prejudices was at first fostered by the
butchers, and it is said that at the begin-
ning of the trade very poor qualities of
English beef were sold as American, for the
purpose of discrediting the genuine article.
Now the American is sold indiscriminately
with the English. One house sells the
American article exclusively, and keeps the
American flag flying as its sign. This mar-
ket is also abundantly supplied with Ameri-
can canned meats, lobsters, salmon, oysters,
turkey and fruits, as well as cheese, bacon,
hams, lard, butter, tongues, flour, corn flour,
hominy, &c. Indian corn and meal is sold
largely, but it is not yet sufficiently well
known to be considered fit for human food.
If the methods of cooking it, so well under-
stood at home, could be introduced here, the
demand for the best quality would be greatly
increased. Printed instructions for cooking it
in various ways, and scattered among the
people, would be of use.

I might cite many such cases, not from
one but many of the leading wholesale and
retail merchants; but you will not fail to
see the condition by the three already noted.

Hence you see the greatest of all draw-
backs with American goods in the lax and
bad manner of packing almost all classes of
goods, and in some cases inattention, and
these being probably the easiest and yet
most important parts. I fail to see the rea-
son why they should be entirely neglected.

Pickled mackerel, so welcome at our home
breakfast table, is never, or very rarely,
seen here. Can it not be added to the al-
ready long list of our food exports? The
same may be said of smoked halibut.

American carriages would be admirably
adapted to the fine roads of this country.
They are not seen in this part of England.
It would seem that a large business could be
done in American doors, sashes and moldings,
and in all kinds of turned articles of wood,
especially of black walnut; also in all the
varieties of builders' ironmongery. The last
trade has already begun, but may be greatly
extended.

**Our Commercial Relations with
Venezuela.**

The following is from Mr. J. E. Eckert,
United States Consul at La Guayana, Ven-
ezuela, to the Department of State:

I am at work on a commercial report, but
not knowing when I will be able to complete it,
I deem it important that the exporters and
manufacturers of the United States should
know in what relations they stand with
merchants and consumers in Venezuela.
I am sorry to be compelled to speak so
plainly in this my first dispatch, but at
the same time am fully aware that the sooner
the true state of affairs is made known the
more will be the advantage to our exports.
If the desire and wants of Venezuela are
strictly adhered to there is every indication
of a good and thriving trade with the United
States; if not they most assuredly will con-
tinue in the trade with Germany, England
and France; and why? Simply because
they know when the goods are shipped they
will be according to order. I have talked
with many, and it is the universal cry: "I
would like in many cases to buy the arti-
cles of the United States, but goods are
packed so poorly, and so little attention is
paid to requirements as set forth in orders,
that it is impossible to do business with any
degree of certainty, and as a matter of fact

we who have to pay a large duty on the
gross weight and can only make a percent-
age on goods in a good condition, have too
much risk to run; while on the other hand,
Germans, English and French are only too
glad to comply to the letter in filling our orders,
however unnecessary the precaution may seem to them. It is true, Ameri-
cans in the manufacture of almost all
goods we use are equal, and in many
cases superior, at the same prices, to
what we get from the Continent, and in addi-
tion orders could be filled in an infinitely
shorter time, as distance is so much less,
and, too, another great item, freight would
diminish in the same ratio; but with all this
we prefer dealing with those who are in-
clined to follow our instructions."

From one or two merchants with whom I
have talked I learn that the class of com-
mercial travelers usually arriving in Venezuela
is not calculated to inspire confidence
with a people who are willing to trade, but
from past experiences are losers instead of
gainers. It is the duty of the commercial
traveler to first ascertain the standing of
the firm with whom he intends doing busi-
ness, to the entire satisfaction of his firm,
and then to take their orders and faithfully
and promptly fill them according to contract,
and not, as was the case with one of the
largest and most reliable houses here, take
the order, and, after keeping the house waiting
for some months, refuse to send the goods.
Once a foreign merchant has had this
experience it will be a long time, if
ever, he regains the confidence required
to renew business with a country at
whose hands he has received such treat-
ment, unless possibly through some commis-
sion merchant whom he might know. It is
also complained of that American merchants
send out agents on commission instead of
salary. In doing this, in many cases, the
agent allows a discount of 7½ per cent instead
of 15 per cent, which is greatly
against the American market, for it deprives
the merchant of 50 per cent. of his discount.
And also one other very important point—
exporters on the Continent allow a six
months' credit (the time actually allowed
here in the retail trade), while thus far the
Americans only allow ninety days. As a mat-
ter of course, in a country where the credit
system is so universally the custom as here,
this gives the advantage to the merchant to
buy and pay with advantage. I will not
speak of the possible good or injury attend-
ing a people who buy on credit to such an
extent, but I speak simply that you may be
aware of one of the great barriers which
exists with trade between the United States
and Venezuela.

To substantiate what I say, let me cite a
few cases which I have taken from mer-
chants, who, in answer to my question—
Why do not the United States do a larger
business with Venezuela? said: "The
Americans seem to imagine that packing,
as directed by us in our orders, is not at all
necessary. I ordered a piece of furniture,
and instead of complying with my order
they packed it in a box, on which I had to pay
duty of over \$100. Duty here is on the
gross weight (box and contents), while if
they complied the duty would have been
probably \$20. I ordered and sent draft for
a piano advertised, as I understood, for \$95,
and, after waiting four months, was in-
formed the price was \$100." The merchant
said, especially in his case, there was no ex-
cuse, as they knew perfectly well his stand-
ing, to say nothing of the dilatory manner of
treating him. On account of some trouble
gas has been done away with, and in its
stead lamps are universally used. A lamp
manufacturing company sent out lamps as
sample, but neglected to send the kind of oil
use in them. A letter was written asking
for sample of oil, but for some unaccount-
able reason the letter was never answered,
and where there was every appearance of a
large order or contract nothing was done.

I might cite many such cases, not from
one but many of the leading wholesale and
retail merchants; but you will not fail to
see the condition by the three already noted.

I might see the greatest of all draw-
backs with American goods in the lax and
bad manner of packing almost all classes of
goods, and in some cases inattention, and
these being probably the easiest and yet
most important parts. I fail to see the rea-
son why they should be entirely neglected.

American lard, refined in Belfast and put
up in bladders, seems to be much preferred
here to the American refined article, and is
bought by large dealers here, even at the in-
creased cost of carriage from Belfast. Can-
not our refiners change this?

Pickled mackerel, so welcome at our home
breakfast table, is never, or very rarely,
seen here. Can it not be added to the al-
ready long list of our food exports? The
same may be said of smoked halibut.

American carriages would be admirably
adapted to the fine roads of this country.
They are not seen in this part of England.
It would seem that a large business could be
done in American doors, sashes and moldings,
and in all kinds of turned articles of wood,
especially of black walnut; also in all the
varieties of builders' ironmongery. The last
trade has already begun, but may be greatly
extended.

Flint Bricks.—Under the title of "Im-
provements in furnaces and other building
blocks, retorts, crucibles, and other fire-re-
sisting articles," a patent has recently been
taken by Mr. E. Selvey, of Bridgeman, Glan-
morganshire, for bricks composed of pure
flint, without the admixture of alumina or
any other substance to detract from the
high refractory character of the material.
The inventor treats the flints in such a man-
ner as to produce from them, when in a pul-
verized condition, bricks or blocks of great
structural strength and durability, superior
in fire-resisting properties, it is said, to the
best descriptions of fire-clay goods. His
patent also extends to the manufacture of
artificial stone for building purposes. The
material when burned resembles a fine-
grained freestone, and is sufficiently hard to
resist the action of the weather. It is in
furnace work and similar applications, how-
ever, that these bricks are expected to be
most successful.

The Cleveland Viaduct.—The long com-
mended viaduct which connects the two
sections of Cleveland over the Cuyahoga
river was opened Dec. 27th with great
ceremonies. Governor Bishop, the military,
the societies and an immense number of
guests participated. After a triumphal pro-
cession there was a banquet and a ball. The
viaduct is over half a mile long, and is built
of masonry and iron. It cost \$2,150,244.

SEAMLESS COPPER PUMP.

(Pat. July 9th, 1878.)

In addition to the great variety of Iron and Brass
Pumps which we have been manufacturing for
years, we are now making a full line of COPPER
PUMPS under a patent granted July 9, 1878. The
Aral and Cone are drawn from SEAMLESS
piece. No brassing or soldering is required. The
pump is lighter and more durable,
and gives a perfect valve seat, and requires no repairs than
those made in the old manner. The barrels are tested
with a five hundred pound inside pressure to the
water mark. The Sprots, Arals, and
Pumpers and Pumpers pronounced them far superior to any
before in the market. The inside of the Pump and
the working parts are thoroughly tinned, giving a
healthy surface to the entire pump. The
bars are of the best and nickel plated.
The Pumps are highly finished, neatly painted and decorated
with gold bronze, the whole being a highly service-
able and ornamental article for the kitchen of the most
costly residence. The trade is invited to call.
No charge for Boxing. Freight paid to Boston or New
York. Orders for all varieties of Pumps filled
promptly. Please send for price list.

UNION MFG. CO., New Britain, Ct.

Warehouse, 98 Chambers St., New York.

For sale in Boston by Walworth Mfg. Co.
Hamblen & Matthews, Brainerd, Dow & Co., Eaton
& Dana, Macomber, Bigelow & Dowse, M. C.
Warren & Co., and Bogman & Vinal; in Provi-
dence by Belcher Bros., and in Worcester by
C. Foster & Co. and White & Conant.We manufacture the only genuine **Burrall Corn Sheller**, having been making them for the
past 15 years. It is therefore of very great importance that you should purchase shellers with our
name on to avoid trouble in getting repairs. We can pack from six to eight in a hogshead. For prices
or other information, address**CLOTHES WRINGERS.**

EUREKA
WRINGER.
BOSTON.

T. J. ALEXANDER, Manager,
BOSTON, MASS.**NATIONAL STEAM PUMP.**Adapted to every possible Duty.
Send for Illustrated Catalogue.**W. M. E. KELLY,**
New Brunswick, N. J.
New York Salesroom, 25 Murray St.**PATENTS.**
THOMAS D. STETSON, 23 Murray St., N. J.,
Patent Solicitor and Expert.

It is best and cheapest.
It is a right-handed Sheller.
It is all iron and very durable.

We manufacture the only genuine **Burrall Corn Sheller**, having been making them for the
past 15 years. It is therefore of very great importance that you should purchase shellers with our
name on to avoid trouble in getting repairs. We can pack from six to eight in a hogshead. For prices
or other information, address

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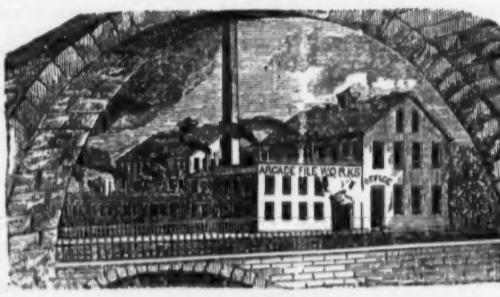


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NEW AMERICAN FILE CO., Pawtucket, R. I.

AUBURN FILE WORKS,
Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
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Manufacturers of SUPERIOR
HAND CUT



FILES and RASPS
Made from Best
ENGLISH CAST STEEL.

Quality guaranteed by written warranty
when required.

Steam and Frost prevented on Show Windows.



REVOLVING VENTILATORS

For everything (and every size), from a hat or cap to an exhibition building. Kitchens, Laundries, &c., ventilated without draft. Durable, strong, without rivets or solder. Oiled for six months. Each one has storm cap. Retail price, size six inch diameter, \$1.00 and upwards; apparatus with which any one can cut circles in glass, 15 cents each.

Protective Ventilators avoid drafts, exclude dust, dampness, malaria and germs of disease; adopted by hospitals, schools, institutions, &c., applied to any window or room.

Prof. A. L. LOOMIS, M. D., University of City of New York, writes as follows:

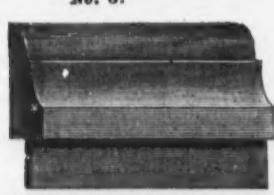
"From my personal experience, I can assure you that your method of removing dust, impurities and dampness from the atmosphere is the best which has as yet been proposed. By it the air in an apartment can be constantly changed without causing drafts. I would especially recommend its adoption in sick rooms, sleeping apartments, nurseries and school rooms."

Air Filters and Moisteners, placed over hot-air registers of furnaces, &c., prevent dust and supply steam filtered air. Price and dimensions to be transmitted on application.

The "Economy" Molding Weather Strip is perfect in every respect. By enlarging one side of rubber or felt, and making slot in molding to correspond (see engraving), we save all after expense of molding. Once purchased it will last a lifetime, because rubber, etc., has only to be removed and taking a piece out of one side and fitting it in the other in a new position. By this method of securing rubber all uncertainty of fastening or undoing of glue or tacks is overcome.

Rubber supplied with enlarged edge and instructions to enable any manufacturer, Carpenters, Builders and for off trade to make slots in Sashes, Doors, Moldings, &c., and thus make perfect Weather Strips.

No. 6.



BRACHER VENTILATOR CO., No. 3 Park Row, New York.

"Common Sense"

MOUSE TRAPS,

For Home and Export Trade.

BEST IN MARKET.

RIPLEY MFG. CO.

Unionville, Ct., U. S. A.

Manufacturers of

House Furnishing Hardware.



**MACHINE MOULDED
MILL GEARING.**

AS ACCURATE AS CUT GEARING.

AND MORE DURABLE IN USE.

Saves Time and Expensive Patterns,

SHAFTING, PULLEYS AND HANGERS.

A SPECIALTY,

LEFFEL TURBINE WATER WHEELS,

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Established 1837.

Manufacturers of Patent Scandinavian or Jail Locks. Brass Pad Locks for Railroads and Switches. Also Patent Stationary R. R. Car Door Locks. Patent Piano and Sewing Machine Locks.

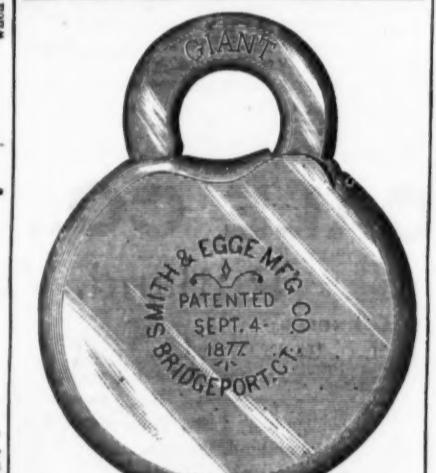
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Best Cast Steel.
HAND-CUT. Manufactured by
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No. 1 Commercial Street, Newark, N. J.

ESTABLISHED 1866.
Chas. Spruce & Co.,
Manufacturers of HAND CUT
FILES AND RASPS.
Every File warranted.
CHALMERS & MURRAY,
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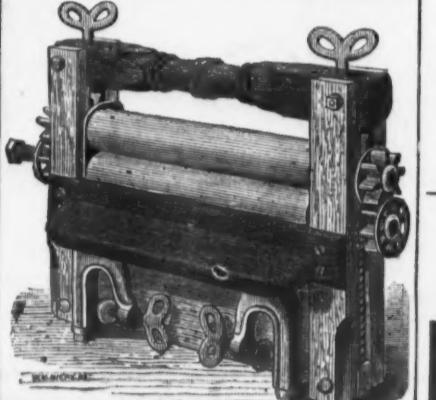
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O. Ames & Sons, Shovels, Spades and Scoops.
A. Field & Son, Tacks, Brads, Nails, &c.
C. F. Warner & Co., Carriage Clamps.
We have also on hand a general assortment of Hardware



THE GIANT PAD LOCK.
Manufactured by
THE SMITH & EGGE MFG. CO.
(Centennial Award.)

"Superior in Every Respect."
This is one of the best selling Locks in the market, and stands the equal of any made. It is thoroughly and strongly made of the best material—very handsome in appearance, and every Lock is warranted. Orders solicited. Address as above
Lock Box 105, Bridgeport, Conn.

Keystone
CLOTHES WRINGERS.



Wood Frame Cog-Wheel Wringers.

No.	Size of Rolls.	Price per doz.
10	10x1 1/2	\$60.00
12	10x1 1/2	\$63.00
16	12x1 1/2	\$68.00
18	12x1 1/2	\$71.00

Wood Frame Friction Wringers.

No.	Size of Rolls.	Price per doz.
1 1/2	10x1 1/2	\$31.00
2	10x1 1/2	\$44.00
3	11x1 1/2	\$52.00

Self-Adjusting Iron Frame Friction Wringers.

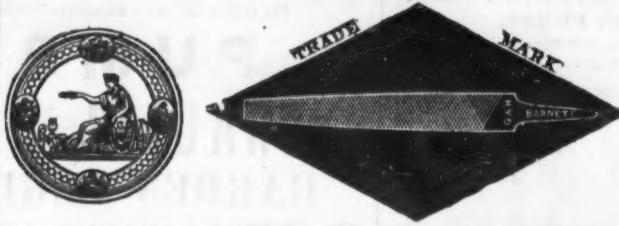
No.	Size of Rolls.	Price per doz.
2 1/2	10x1 1/2	\$4.00
3	10x1 1/2	\$4.00
4	11x1 1/2	\$5.00

EVERY WRINGER WARRANTED.

Special rates given for export.
Send for price list of other goods for home and export trade.

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Black Diamond File Works.



Awarded by Jurors of Centennial Exposition, 1876, for
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G. & H. BARNETT,
39, 41 & 43 Richmond St., Philadelphia.

CHARLES B. PAUL,
Manufacturer of HAND CUT FILES.
Warranted CAST STEEL.
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Established 1863.

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MANUFACTURERS OF CELEBRATED
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In view of the many so-called improvements and ingenious arrangements of the teeth of Horse Rasps made within the last few years, we take occasion to recommend our own Horse Rasps, made of the best American Steel, all hand-cut in the old style by the most skilled mechanics; and we guarantee them to be unequalled in the market, as is best evinced by the unanimous verdict of all the skilled horsehoers who are using them for the last fifteen years all through the United States. For sale by the leading Hardware and Iron Dealers in the United States and Canada.

AUSABLE HORSE NAILS
POLISHED OR BLUED.
HAMMERED AND FINISHED



The Ausable Nails
Are Hammered Hot,
And the Finishing and Pointing are
Done Cold,

Thus Imitating the Process of Making Nails by Hand.

Quality is Fully Guaranteed.

For Sale by all Leading Iron and Hardware Houses.

ABRAHAM BUSSING, Secretary,
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**ZUCKER & LEVETT,
NICKEL PLATERS'
SUPPLIES.**

Estimates for Complete Outfits Furnished.

639 & 641 West 51st Street, New York.

THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
TWO-SPINDLE DRILLS. Self-feed.
MULTIPLE DRILLS. 2 to 8 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.

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A. FIELD & SONS

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

WIRE NAILS, TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

Hoisting Machinery
MANUFACTURED BY
CRANE BROTHERS MFG. CO.,
Chicago.

The Upright Family Scale
PATENTED.



With Tin Dish,
Weighing 12 lbs.
by 1/4 lb.
List \$16 per
Dozen.

Liberal Discount
to the Trade.

This Scale has an
attachment for
Taking the
Tare. Just the
thing for family use.

Packed one dozen in a
case.
No charge for cases.

Manufactured by
JOHN CHATILLON & SONS,
89, 91 and 93 Cliff St., NEW YORK.

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Manufacturers of

MEASURING TAPES.

Of Cotton Linen and Steel.

For all purposes for which Tape Measures are required.

Only manufacturers of

Paine's Patent U. S. Standard Steel

Measuring Tapes,

Pat. Spring Measuring Tapes

of Linen and Steel.

FINE TEMPERED STEEL SPRINGS.

From 1/4 inch wide upward.

Warranted tougher than

any other Band Saw.

Catalogues on application

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London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and **only** Award and Medal for Self-Coiling Steel Shutters at Centennial Exhibition, Philadelphia, 1876.

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ORIGINAL INVENTORS AND SOLE

PATENTEES OF

Noiseless Self-Coiling Revolving

STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

Also Improved

Rolling Wood Shutters

Of various kinds. Clark's Shutters are the **Best** and **Cheapest** in the world. Are fitted to new Tribune Building, Lenox Library, Delaware and Hudson Canal Co.'s Building, Transatlantic Steamship Co.'s new Dock, American News Office, &c., Posey County Court House, Mt. Vernon, Holt County Court, Oregon, Mo. Also to buildings in Boston, Cincinnati, Detroit, Janesville, Wis., Baltimore, Canada, &c. Have been for years in daily use in every principality throughout Europe, and are endorsed by the **Leading Architects of the World.**

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ANSONIA CORRUGATED STOVE PLATFORM

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Patented
Oct. 24, 1876.

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Bronzed Fire Screen,
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PATENT APPLIED FOR.

The Portable Bronzed Fire Screen or **Shield**, as shown in the illustration, is especially designed for the safety and protection of walls, furniture, woodwork, paper or varnish from heat.

Being constructed of metal, with fine and substantial edges, cut out in form to fit around a stove, it may be easily fitted to any position about a stove, before a grate or fire place. The demand for something useful, durable and ornamental as a Fire Screen has long been felt, and having finally accomplished the desired result, we are prepared to fill all orders promptly.



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OF

GEAR WHEELS

can be sharpened by grinding without changing their form. Cutters made on this plan will outlast many of the old form, with the advantage of being always ready

for use. If the cutter becomes dull before a wheel is completed, it can be taken out, sharpened and returned to its place in a few moments without risk of altering the form of teeth to be cut. Cutters for milling any irregular form made to order on the same plan. Parties having occasion to use mills for irregular shapes on sewing-machine, gun or other work, will readily see the advantage such cutters possess over those in general use, both as regards economy and convenience. Descriptive circular with price list sent by mail on application.

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Manufacturers of

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The Electric Light.

The rapid progress which the science of electric lighting has made within a short time, and its immense importance to the world, has attracted very great public interest in this country and in the old world. There has been much misunderstanding on the subject, and a very general feeling exists that the production of light by electricity is an entirely new invention. To correct the misapprehensions on this subject and give our readers a general idea not only of what has been done in the past, but what is now going on, we have prepared a series of articles upon the history and present state of electric lighting. In addition we shall take up the machinery, &c., now in use and give descriptions and illustrations.

For years there has been all over the civilized world a progressively increasing agitation on the subject of illumination by electricity. This agitation, hitherto confined to scientific and industrial circles, has within the past few months reached a climax, and has profoundly aroused the interest of the public in general. Long-established interests, until now unaffected by advances in electric illumination, are suddenly regarded with a suspicion of their stability and future enjoyment of an undisputed monopoly in consequence of a rumor that Edison has practically overcome the last barrier opposing a general introduction of electric illumination—the divisibility of the electric light. This rumor has been given shape by the formation of a company and by the repeated professions of Mr. Edison that he has actually succeeded. While the panic to which it gave rise, and which was more pro-

ferent branches of the same current, it is necessary to furnish each branch with a regulator so contrived that an increase of current corresponding to too near an approach of the carbon points will produce automatically an increased resistance in that branch circuit, whereas an accidental increase in the distance between the carbon points of any lamp will cause the regulator to reduce the extraneous resistance of the circuit to a minimum."

While thus the divisibility of electric light and its application to domestic illumination is a matter still in its infancy, yet possibly on the eve of a successful solution, there are other applications of the electric light which have already earned a well-established practical application, the importance of which cannot be overestimated. We refer to the lighting of industrial establishments, warehouses, harbors, public squares and light-houses, which at the present period of development more directly interest manufacturers.

The history of electric illumination is associated with some of the most famous names of modern science. In 1811 Sir Humphrey Davy made his discovery of the voltaic arc between carbon points, produced by voltaic batteries, but the cost of electric lighting by the aid of voltaic or magnetic batteries would be enormous, and it was only when dynamo-electric machines were introduced and perfected, by which power could be converted into electricity, that it became of any practical value whatever. Faraday in 1831 added the second fundamental discovery, that of the induction of electricity by magnetism, which laid the basis for electro-magnetic machines. He

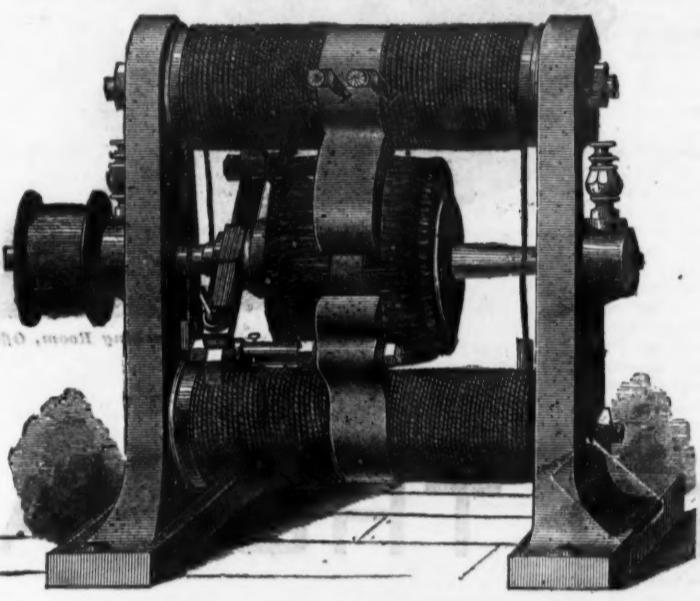
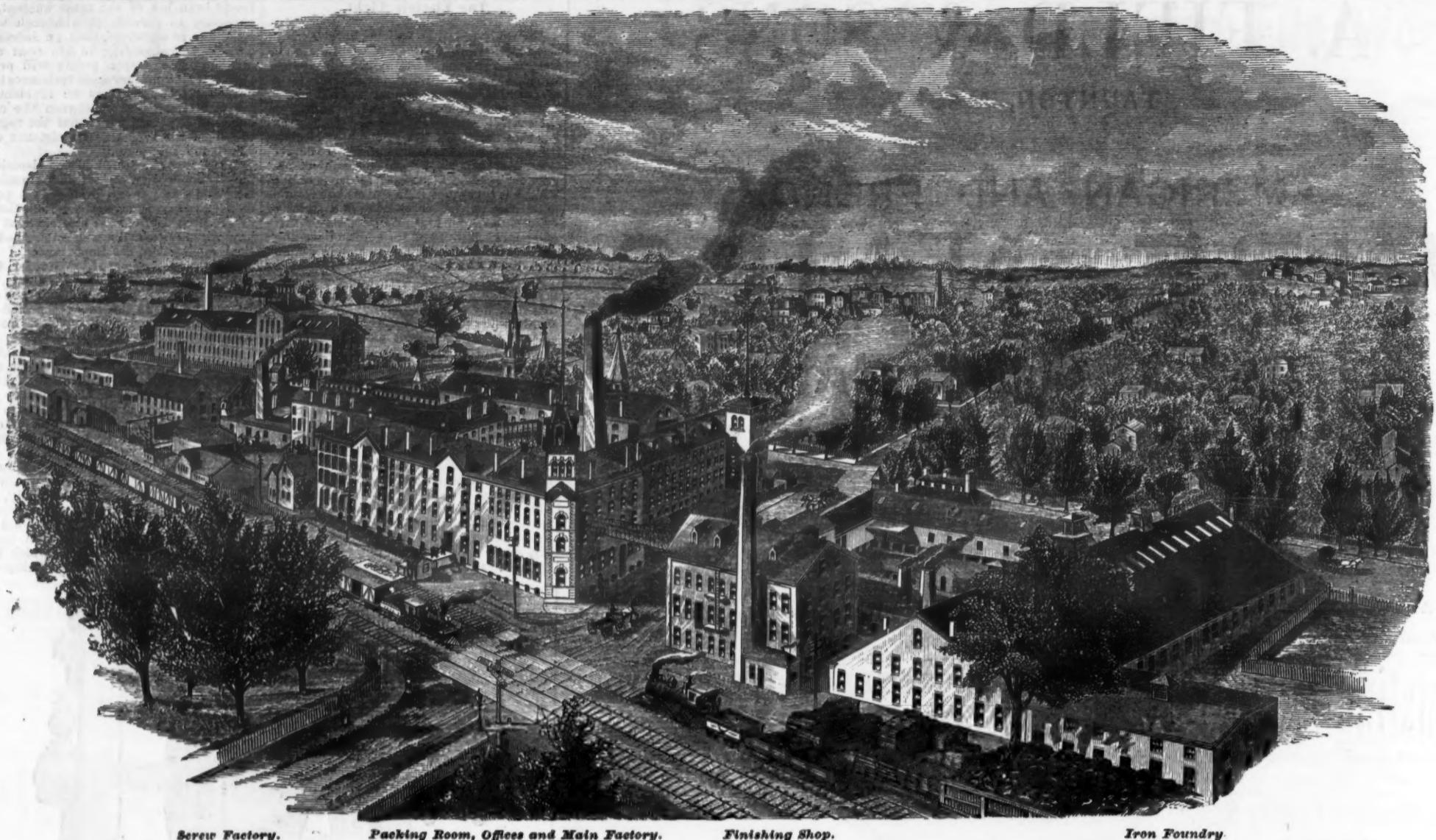


Fig. 1.—THE GRAMME MACHINE.

nounced in England than in this country, has in a measure given way under the deliberations of calmer judgment, there is still a strong inclination to consider the days of the undisputed sway of gas and petroleum as illuminants to have passed. Nothing has been published, however, by which Prof. Edison's claim, which rests alone on his statement, is substantiated, and until this has been done judgment on the applicability for domestic purposes in direct competition with present means of illumination, must be suspended. Mr. Edison is not the first who has confidently proclaimed assured success, and we would recall to memory that in the first quarter of the last year L. Denayrouze claimed, before the Academies of Sciences, with much enthusiasm, for Paul Jablachoff, the great improvement of the divisibility of the electric light which subsequent experience has not sufficiently substantiated. Mr. Jablachoff introduced into the central circuit of the machine the interior wire of a series of induction coils, and interposed between the two extremities of the exterior wire of each coil a plate of kaolin, which, glowing with the heat, was said to emit a beautiful light. By varying the dimensions of the bobbins and the diameter of the wire it was claimed that small and medium lights could be obtained by which carbon points, and with it regulator lamps were done away with. Mr. Jablachoff has recently written to the *Correspondance Scientifique* a series of letters, in which he reasserts his claim, supplementing it with the information that he has succeeded with a new apparatus, the "amplifier," in distributing the electricity generated by any machine through a single conductor to several points, increasing it at the same time.

Dr. Siemens, alluding to the announcement of Edison's discovery, gives the following description of the problem: "In passing an electric circuit from a main conductor into several or any number of branches, the current divides itself between those branches, according to the well-known law of Ohm, in the exact inverse ratio of the electrical resistance presented by each branch. A current may thus be divided, for instance, into 10 separate currents of precisely equal force, if each branch is made to consist of a wire of the same length and conductivity; but if one of these wires was again to be slit into 10 wires, presenting in the aggregate the same conductivity, each of these wires would only convey 1/10th part of the total current. In the same way one of the minor wires might again be subdivided into branches, each of which would convey an amount of electric current which would be accurately expressed by the relative resistance of the branch in question, divided by the total resistance of all the branches put together. It would thus seem that nothing could be more easy than to divide a powerful electric current among as many branches of varying relative importance as might be desired; but in the case of electric lighting a difficulty arises in consequence of the varying resistance of each electric light or candle, due to the necessarily somewhat varying distance of the carbon points from each other, upon which the length of the luminous arc depends. In order to work a number of lights upon dif-



Screw Factory.

Packing Room, Offices and Main Factory.

Finishing Shop.

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TO THE HARDWARE TRADE OF THE WORLD.

We extend to all our friends in the trade our best wishes for a Happy New Year. We have now in press, to be issued about February First, a new and complete Illustrated Catalogue of American Hardware, embracing a full list of our own manufactures, and also of general hardware on sale at our several warehouses. As soon as the Catalogue is ready for delivery we shall take pleasure in furnishing a copy to each of our old friends and customers, and to as many new friends in the trade throughout the world, as, being properly introduced to us, may apply for the same.

Yours very respectfully,

RUSSELL & ERWIN MANUFACTURING COMPANY.

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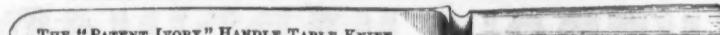
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Agents for the BENGALL RAZORS.

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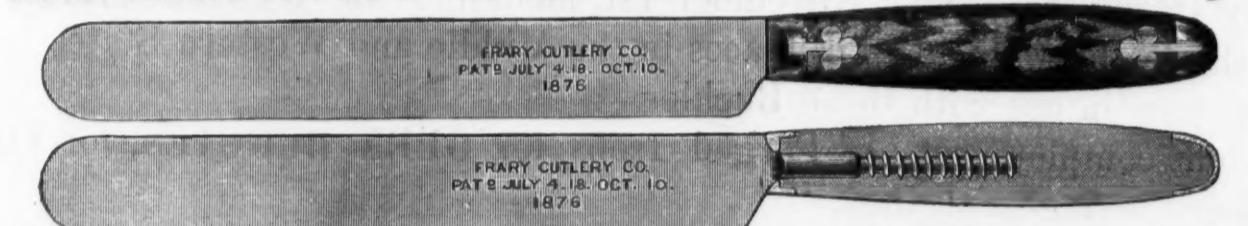
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The above illustrations represent their New Patent Screw Tang Lock Fast Solid Handle Knife.

There is no question but that a solid wood handle knife is much more preferable than a scale tang. The great objection to their use hitherto is, that no solid wood handle has been placed on the market with the handle properly secured—no handle put on with cement will stand the wear and tear of every day usage. The cement will expand and contract with the action of heat and cold, and become loose, crack and come off, causing great prejudice against their use. This objection is overcome in our patent screw tang. A wood screw is welded to the tang of the knife or fork, and screwed firmly and securely in the handle and locked there by the bolster, making a very strong and handsome knife, which we warrant never to get loose, crack or come off. We manufacture a large variety of patterns, both Table, Butcher and Carvers, and furnish the patent handle nearly as low as the scale tang. We are prepared to furnish this line of goods, together with the scale tang and iron handle, very promptly, and very respectfully invite the attention of the trade.

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MANUFACTURERS OF
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Send for circular.

Recommended as
the best hand Clip-
per made.
\$3.50 EACH.
Extra pieces for
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Agent for CLEMENT & MAYNARD'S Trowels, Hoes,
Shovels, Spades and Scops. Their Trowels and Hoes
have entirely supplanted the English by their quality
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Steel and File Manufacturers,

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Corporate Mark.

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POCKET KNIVESThe assortment of Gardner's Celebrated
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All of Gardner's Patent Knives are fully warranted.

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No. 118, Improved Adjustable Circular Plane - - \$4.00

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The demand for Joseph Rodgers & Sons' products
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To distinguish Articles of Joseph Rodgers & Sons

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Having largely increased our facilities for the man-
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you at a large reduction from our former
prices. The list price of the large size is now \$2.00
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facture of our Patent Folding Scissors is of
the very best. All are nickel-plated and furnished with
a neat morocco case.

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SYRACUSE CUTLERY COMPANY,

Manufacturers of

Pen and Pocket Knives,

Warranted made from

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Near 71 Clinton St., SYRACUSE, N. Y.

course, four spaces between them, and in these spaces revolve four bronze wheels, each carrying 16 bobbins, corresponding to the number of poles in each circular set of magnets; there are, therefore, 64 bobbins resting between the poles of 40 compound magnets. The core of each bobbin consists of a tube of soft iron slit longitudinally, which form enables the magnetization and demagnetization to be effected with less resistance, consequently with less development of heat, and, therefore, with a smaller expenditure of power. The wires in all the bobbins are wound in the same direction, and the bobbins can be connected together in series or in sets of parallel circuits, according to the sort of current required. From the above description it is clear that at each revolution of the machine each core has its magnetization reversed 16 times, being magnetized eight times in one direction and eight times in the opposite; the 64 bobbins produce, therefore, no less than 1024 alternating currents for each revolution of the axis. This alternating current is rather an advantage for the electric light than otherwise, because it causes the two carbon points to consume at an equal rate, and, moreover, keeps them both tapered to a point. When the electric light is produced by a continuous current, such as that from a Gramme's machine or from a voltaic battery, the positive carbon shortens at twice the rate of the negative, its point becomes first flattened and then cup-shaped, and the edges of this depression have a tendency to cast a shadow, and a portion of the light is lost.

The Alliance machine has until recently been considered one of the best, and it has been quite extensively used for light-house purposes, but for the lighting of industrial establishments it is too large and too costly compared to others of more recent date. In the year 1854 Siemens introduced his armature, which consists of a revolving cylinder of soft iron having a deep and wide groove cut longitudinally along its opposite sides and continued round the ends; in this groove the wire is wound in a way that has been compared to the thread upon a shuttle. The poles of this armature are the two cylindrical faces; that is to say, those two portions of the cylindrical surface which have not been cut away in forming the groove. This is the armature adopted by Ladd and by Wilde, of Manchester. A most important discovery—that of the reaction principle—was made by Wheatstone and Siemens independently, although they were each brought before the Royal Society on the same day. This reaction principle consists essentially of the utilization of the residual or inherent magnetism of the core of the electro-magnet, and which is the property more or less of all iron—whether circumferenced by an electric current or not—for producing, in the first instance, a feeble current in the wire surrounding it. This current, feeble as it is, is sufficient to increase the magnetism of the core, and this increased magnetism reacts on the wire, producing in it a still stronger current. Thus mutual action and reaction go on until, in a few seconds, the electro-magnets are charged to the fullest extent and the machine is working at its greatest power. This is the principle upon which the electro-magnets are excited in the larger Gramme, the Siemens, Ladd, Wheatstone and Varley machines. Wilde's later machines embrace the same principle. Messrs. Bauer and Haebel's machine, which is the most popular in Germany consists of a Gramme armature, revolving within a cylindrical box of soft iron formed by the spreading out of the polar extremities of the exciting magnets, so as almost to envelop the rotating armature, leaving but two narrow spaces separating the poles from one another. In all other respects it is a Gramme machine, which is the most popular in France.

The Gramme machine (Fig. 1*)—a modification of the earlier Pacinotti machine—consists of two cylindrical electro-magnets, with their combined poles extended by pieces of such shape as nearly to envelop the armature which rotates between them. The latter is composed of a ring of soft iron, over which 60 coils of insulated copper wire are wound, connected successively at their ends. The loops thus formed between each pair of coils are connected to the copper strips of the commutator, the number of which is equal to that of the armature coils. They are placed radially edgewise around the shaft of the machine, and insulated from each other and the shaft, thus forming a cylinder, the surface of which is composed of alternate strips of copper and insulating material. Upon the surface of the commutator rest bundles of soft iron wire, by which the currents generated in the armature coils are conducted to the external circuit. As the armature is rotated between the poles of the field magnets, currents of electricity are generated.

Recently Mr. Gramme has designed a new machine capable of generating alternate currents, which are required for the Jablochkoff light.

(To be continued.)

Bismarck's Tariff Policy.—The Provincial Correspondence (semi-official) reproduces Prince Bismarck's letter relating to tariff revision, and remarks that should the system recommended therein secure a revenue from some articles proportionately as considerable as that derived by England and America, there will be nothing to prevent a reduction of the number of articles taxed when taxation is found burdensome. The proposed tariff will also be advantageous in negotiating treaties of commerce, as Germany can obtain concessions in return for the relinquishment of duties.

Example of Trade Depression.—The depression of the iron trade is such that the New British Iron Company have resolved to close a very large portion of their great iron works at Corngreaves. It will be remembered that Mr. J. P. Hunt, chairman of the Ironmasters' Association, is the chief manager of these extensive works, and has arrived at the above conclusion with much regret, in view of the very large number of men who must forthwith be thrown out of employment.

* We are indebted to E. J. Knight, Secretary of the Franklin Institute, for this and the following illustrations.

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BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

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PRICE and QUALITY GUARANTEED.
All the above Stones are of good
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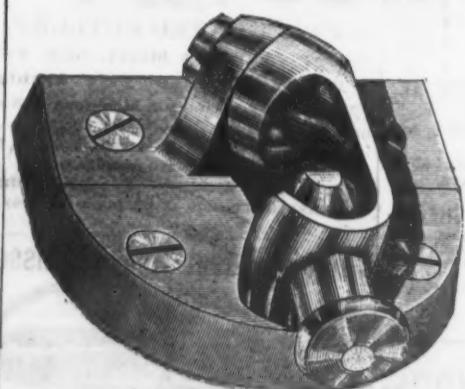
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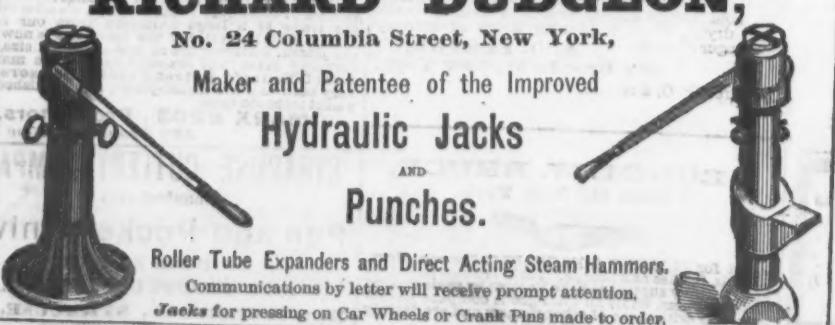
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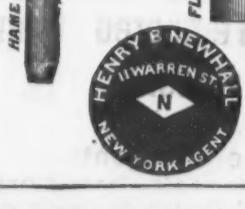
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Old Boots and Shoes can be Straightened
AND
NEW ONES KEPT STRAIGHT
BY USING
LYON'S PATENT METALLIC HEEL STIFFENER.

These can be applied to any Boot or Shoe at any time by any one.



Every pair is warranted to bend to fit the boot without breaking.



All Boxes must be marked, Manufactured only by NELSON LYON, Albany, N. Y., under Patents of July 9, 1872, May 18, 1875, July 11, 1876.

Send for Catalogue.

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A. S. ROBINSON & CO.,
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SOLE MANUFACTURERS OF THE

VICTORY
Combined Snow Shovel
and Ice Pick.

Manufactured under Patents of July 10th, 1877,
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As seen in the accompanying cut, the handle can be taken from the blade by throwing back the cam lever which holds it. On the end of the handle there is a steel point which makes a good Ice Chisel.

Catalogue sent on application.



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The back strain when the wrench is used is borne by the bar—not by the handle.

The strongest Wrench made, and the only successful Re-enforced Bar.

None genuine unless stamped

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Scientific and Technical Notes.

Prof. John A. Church, of Columbus, Ohio, has read before the Chattanooga meeting of the American Institute of Mining Engineers a paper on the

HEAT OF THE COMSTOCK MINES,
from which we take the following interesting data. Although subject to fluctuations which we shall refer to further on, the rock in the lower levels of the Comstock lode, near Virginia city, Nev., from which the enormous treasures of the Bonanza mines have been taken, appears to have a pretty uniform temperature of 130° F. In freshly opened ground it varied from 108° to 116° F., and higher temperatures are reported at various points, reaching in fact as high as 123 degrees in the 1900 level of the Gould & Curry. The temperature of the air is subject to more fluctuations than that of the rock, as it is artificially supplied to the mine and varies according to the distance to which it is carried, the quantity, velocity in the pipe and its initial temperature. "Hot" drifts are not usually above 108 to 112 degrees, though when they are very long they rise to 116 degrees. These limits are, however, not in the least degree true of the water which enters the drifts from the country rock, and also from the lode rocks. That approaches more nearly 150° F. The vast body of water which has filled the Savage and Hale & Norcross mines for more than a year, and from which it is safe to say 1,000,000 tons of water have been pumped within 12 months, gave a temperature of 154° F. It has been frequently noticed that some parts of the mines are hotter while others are colder than the average, and it seems that these hot areas lie in belts and are not irregular or promiscuously placed in the mass of east country rock. Hot belts are noticed in the vicinity of dykes, at the contact of diorite and propylite, and generally near the line of contact of two rocks. Again, there are cold belts which, though fewer in number, are more strongly marked. The rock is in such cases always wet, though on the other hand it is by no means certain that water indicates cold portions of the mines. The source of the heat is not, as has been supposed, the feeble remnant of a temperature that once reached the point of rock fusion, nor is it the oxidation of the sulphurates present in small amounts, as the following analyses of water from the vein prove :

BAGSLAW'S RELIEF VALVE,
which consists of a piston moving in a small cylinder, the lower end of which, containing a valve, is connected with the cylinder, while the space above the piston is in communication through a pipe with the valve-box. The piston is directly connected with the valve below, which is opened by the action of a coil spring operating directly upon the piston, the surface of which is somewhat greater than that of the valve. When the engine is standing there is no pressure on the piston, which consequently allows the coil spring to open the valve and let all condensed water run off as soon as formed, thereby preventing that accumulation of water an interval of rest which has been the cause of so many cracked cylinders and serious accidents. Immediately steam is turned on to start the engine it has access to both the valve and piston, and the latter having the greater area, presses down the valve and keeps it closed as long as the engine is working properly. Should, however, the boiler prime, and water gain access to the cylinder, the valve will open automatically and relieve any excess of pressure before rupture of any part can take place. Thus the pressure of steam acts on the valve exactly as a spring or dead weight, with this advantage, that it cannot be over-weighted, and any desired margin of safety can be obtained by enlarging or reducing the area of piston. The stop cock enables the attendant to open the valve, while the engine is working, at such times as he wishes to use it like an ordinary drain tap, and neglect to open the stop cock in no way affects the safety of the cylinder.

M. Olivier Mathey, a Neufchâtel chemist, communicates to a French periodical the following data on the

COMPOSITION FOR PHOSPHORESCENT WATCH DIALS,

which have been exhibited in this country for some time. The dials are usually made of paper or thin cardboard, enameled like visiting cards. They are covered with an adhesive varnish, or with white wax mixed with a little turpentine, upon which is dusted with a fine sieve powdered sulphide of barium—a salt which retains its phosphorescence for some little time. The sulphides of strontium and calcium possess the same property, but lose it more quickly than the former. After the dial has remained in darkness some days it loses its phosphorescence, but this may be readily restored by exposure of an hour to sunlight, or, better still, by burning near the dial a few inches of magnesium wire.

St. Paul Island Power Co.—Some very important negotiations between the Island Power Company and the St. Anthony Falls Water-Power Company were brought to a close at the end of last month. The St. Paul Pioneer of the 30th says: The Island Power Company, incorporated by Messrs. W. W. Eastman and A. B. Barton, of this city, and Messrs. John L. Meriam and A. H. Wilder, of St. Paul, have bought of the St. Anthony Falls Water-Power Company five hundred horse-power of water, to be taken on their main dam on the east side of and extending to the foot of Nicollet Island. This means business. The Island Power Company propose to build up a manufacturing center on the lower end of Nicollet Island, and as the first step will at once enter upon the construction of an immense building, to be leased, with power, for manufacturing purposes. The building will be five hundred feet long by sixty feet in width, and two stories in height above the basement, which makes it to all intents and purposes a three-story building. It will be located on the east side and at the lower end of the island; will be built of stone, with iron roof, and divided by fire-proof walls into the equivalent of twelve rooms, each sixty by one hundred feet. These rooms will be supplied with shafting and rented to parties desirous of engaging in various branches of manufacturing. One hundred and fifty horse-power of water will be sufficient to drive all the machinery in this building, work upon which will be commenced at once, and it will be completed and ready for occupancy by June 1, 1879. The Island Power Company will then have three hundred and fifty horse-power, with four acres of land, remaining to be utilized in other manufacturing enterprises, which will doubtless spring into existence at an early day. The location is convenient and accessible—only about four blocks distant from the City Hall—and the enterprise supplies a deficiency long felt and often and earnestly discussed by the Board of Trade. There has for years been a demand, constantly increasing, for rooms to lease with power, and the Island Power Company's scheme fills the bill. It is an enterprise which can but prove remunerative to its originators and immensely valuable to the city.

DUPLEX SYSTEM OF TELEGRAPHY FOR CABLES
seems to have been successfully applied to the Atlantic cables with an increase of working capacity of 70 per cent., it may be of interest to cite the following data on other submarine cables, as given by Sir James Anderson: On the Malta-Marseilles cables, a distance of 825 miles, 15 words per minute are worked simplex, 26 words duplex, an average of 84 per cent. As far back as March, 1877, the working increase of speed upon the Bombay-Aden cable, which in electrical capacity about equals the Anglo-American cables, was 40 per cent. Upon the Aden-Suez cable, a distance of 1,460 miles, the increase was 60 per cent. Sir James Anderson states that a steady increase of 70 per cent. can be commanded in favor of duplex over simplex.

Messrs. Giles, Hopkins & Co. have just completed an order for two miles' length of WOOD'S WROUGHT IRON SLEEPERS and CLIP CHAIRS.

These sleepers are about to be put down on the railway between Middleborough and Easton, over which very heavy traffic passes, in order fully and fairly to test their capabilities. If they answer expectation they will probably soon come into general use and supersede the present wood sleepers. The patent sleeper is extremely simple in construction. It consists of an inverted trough, and through square holes punched in this trough a clip chair of rolled wrought iron or cast steel is slipped from the under side. The clip chair is of horseshoe shape, one side forming a hook about 2 1/4 inches wide, and the other side is like one jaw of an ordinary railway chair for taking a wooden railway key. The wooden key fastens the rail tightly upon the sleeper, as well as holding the clip chair in its place.

M. de Cyon has recently completed a series of experiments on the

PHYSIOLOGICAL ACTION OF BORAX,
of importance as bearing on the applicability of that substance for preserving meat. He fed dogs, in one series of experiments, on meat preserved by M. Jourde's process, and in another on fresh food to which various

The Iron Age

AND
Metallurgical Review.

New York, Thursday, January 2, 1879.

DAVID WILLIAMS - - Publisher and Proprietor.
JAMES C. EAYLES - - Editor.
JOHN S. KING - - Business Manager.

RATES OF SUBSCRIPTION INCLUDING POSTAGE.

IN THE UNITED STATES, BRITISH AMERICA AND
SANDWICH ISLANDS.

Weekly Edition.....\$4.50 a year.
Issued every Thursday morning.
Semi-Monthly Edition.....\$2.30 a year.
Issued the First and Third Thursday of every month.
Monthly Edition.....\$1.15 a year.
Issued the First Thursday of every month.

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should be made by draft, payable to the order of David Williams, or any banking house in the United States or Europe; or, when a draft cannot be obtained, the amount may be made up in the postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS
in any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the Wilmer & Rogers News Company, New York, U. S. A., and London, England; or the San Francisco News Co., San Francisco, California, U. S. A.

RATES OF ADVERTISING.
One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$30.00; one year, \$40.00; payable in advance.

DAVID WILLIAMS, Publisher,
33 Read Street, New York.

PITTSBURGH.....7 Fourth Avenue
Jos. D. WEEKS, Manager and Associate Editor.

PHILADELPHIA.....20 South Fourth Street
THOS. HOBSON, Manager.

CINCINNATI.....Merchants' Exchange
S. B. LOWE, Manager.

CHATTANOOGA.....Eighth and Market Streets
S. B. LOWE, Manager.

BRITISH AGENCY.
The publishers of *The Ironmonger*, 148 Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

AUSTRALIAN AGENCY.
The American Hardware Company, Melbourne, are agents for Australia. Sample copies will be mailed by them, free of charge, to any firm engaged in the trades we represent in Australia, Tasmania and New Zealand.

CONTENTS.

First Page.—Gantier Steel Company, Limited, Johnstown, Penn.

Third Page.—Effect of Time and Sectional Cohesion Upon the Rupture of Rolled Iron.

Fifth Page.—Effect of Time and Sectional Cohesion Upon the Rupture of Rolled Iron (Concluded). The Great Iron Pier, Pavilions and Breakwater at Long Branch. Steel Headed Rails.

Seventh Page.—American Interests in Sheffield. Our Commercial Relations with Venezuela. Flat Bricks. The Cleveland Viaduct.

Ninth Page.—The Electric Light.

Eleventh Page.—The Electric Light (Concluded). Bismarck's Tariff Policy. Example of Trade Depression.

Twelfth Page.—Scientific and Technical Notes. St. Paul Island Power Co.

Fourteenth Page.—The Old Year and the New. Unconscious Testimony to the Value of American Ideas and Manufactures. The Siemens-Martin Discussion. The English Failures and Late Trade Statistics.

Fifteenth Page.—The English Failures and Late Trade Statistics (Concluded). Recent Advances in the Metallurgy of Iron and Steel. Metallurgical Notes. New Publications.

Seventeenth Page.—Annual Review of the Manufacturing and Iron Industries of Eastern Pennsylvania (Concluded).

Eighteenth Page.—Annual Review of the Manufacturing and Iron Industries of Eastern Pennsylvania (Concluded).

Nineteenth Page.—Industrial Items.

Twenty-first Page.—The New Tariff with Japan. Financial Gloom in England.—A Sad Retrospect of the Year 1878. Labor Notes.

Twenty-first Page.—Trade Report. General Hardware. Iron. Metals. Coal.

Twenty-second Page.—Imports. Old Metals, Paper Stock, etc. Philadelphia, Pittsburgh, Chattanooga, Boston, St. Louis, Cincinnati, Baltimore, Louisville, Richmond. One English Letter.

Twenty-third Page.—Our English Letter (Concluded). Foreign. General Review of the Metal Market, 1878.

Twenty-fourth Page.—General Review of the Metal Market, 1878 (Concluded).

Thirty-first Page.—The Iron Age Directory.

Thirty-fourth Page.—New York Wholesale Prices.

Thirty-fifth Page.—New York Wholesale Prices (Concluded).

Thirty-ninth Page.—Philadelphia, Buffalo, Chicago and Pittsburgh Hardware and Metal Prices.

Forty-first Page.—Boston and St. Louis Hardware and Metal Prices.

The new Weights and Measures act of England promises to give rise to some trouble between employers and employed. It is a fact not very well known in this country that the prices paid per ton for mining, puddling, etc., is for a ton of 2400 pounds, and not of 2240—a fact which makes considerable difference in comparisons. For example, puddling is 7s. 6d. in South Staffordshire, or, at 24 cents to the shilling, \$1.80 for 2400 pounds. Reducing this to the basis of 2240 pounds, it is \$1.68. This is for doing what in this country at the largest works costs from \$3 to \$6. After January 1, under the operation of this act, the long ton of 2400 pounds will be abolished and the ton of 2240 pounds be used. Workmen are already giving notice that they will expect the same wages for the smaller as for the larger ton, which is virtually a demand for an increase of 7 per cent. Under existing conditions their chance of getting it is extremely small.

The Old Year and the New.

The year which closes as these pages go to press is one that does not afford material for a pleasant retrospect, regarded from a commercial standpoint. Its events as concerns the metal markets are shown in the annual reviews which we print in this and succeeding issues. These are prepared with great care by members of our staff, and will be found to give a clear, correct and condensed history of the course of trade for the past twelve months. It is unnecessary that in this article we should dwell upon details.

Generally speaking the year 1878 will be remembered as the darkest within the experience of the present generation of business men. Hundreds who were proof against the shock of panic have been compelled to yield to the steady, unremitting pressure of hard times. The continued shrinkage since September, 1873, has taxed the resources of the strongest concerns, absorbed accumulations of capital and defeated the best efforts of commercial enterprise. When the panic of 1873 burst like a storm over the country, few were wise enough to see what the future would bring forth. The tornado seemed for a time to pass over the heads of merchants and manufacturers and expend its fury upon great banking corporations and the railroad schemes with which they were identified. The legitimate business interests of the country seemed to be founded upon a rock; but when the shrinkage began and continued year after year, the rock crumbled into sand and the sand washed away.

Unconscious Testimony to the Value of American Ideas and Manufactures.

It is in no boasting spirit that we from time to time refer to the changes that are taking place in England in reference to American ideas and American manufactures. We have believed that our industrial policy has been the right one, and that events would justify its wisdom. We have had faith in the growing excellence of our manufactures, whether that excellence be tested by quality, variety, adaptability or cheapness, and have believed that this would in the end be acknowledged. Consequently, when the wisdom of our course has been justified and the excellence of our products conceded, we have felt it due to our readers that the facts be laid before them.

In a recent issue we gave some extracts from one of our English contemporaries, showing how, unconsciously in all probability, a large and influential class of English manufacturers were abandoning the supposed impregnable arguments of free trade and intrenching themselves in those that protectionists have been using. For example, the *Engineer* says:

A favorite argument with protectionists is that the imposition of heavy duties on imported goods fosters home manufactures to such an extent that native goods can at last be sold at lower prices than those which must have been paid for them had they been imported duty free. This has been stoutly denied by the free trader; but we venture to think that the denial has not invariably been justified by the facts. If, for example, we take the iron trade of the United States, it will be found that protection has done so much for it that rails and bars and girders are sold to the American consumer at about the same price as that which similar articles fetch in English markets. As far as the American consumer of iron is concerned, he is rather the better for protection than the worse—a fact opposed to all accepted theories of political economy. What is true of the iron trade of America is true of other trades in other countries. Protection so developed the manufacture of sugar in France that she can now export it to England, while our own sugar refiners are undersold and the trade has been ruined. It must, we think, be admitted that the immediate result of protection is that it attracts capital and does undoubtedly develop manufacturing industries.

If the foregoing had been read to the average English ironmaster, and he had been asked to "guess" from what journal it was taken, he would have said the *Bulletin* of the American Iron and Steel Association or *The Iron Age*. It would never have entered his head that it was from the most extensively circulated of the English technical journals. Had these same words appeared in *The Iron Age* five years ago, our friends on the other side would have pitied our ignorance of the first of the "broad principles" of political economy, and read us a lecture on the comprehensiveness of our misconceptions. Now it is beginning to be accepted as good doctrine. John Stuart Mill was roundly berated for suggesting that there might be circumstances in which it would be advisable for a country to adopt a protective tariff, but his followers and admirers have taken especial care to point out that the United States was not in such a position. The error of political economists seems to have been that they have dealt with the ideal man who does not exist.

We find in the last *Ironmonger* at hand another unconscious admission of a fact that has for some years been claimed to exist by our steel manufacturers, and as strenuously denied by English periodicals and manufacturers. Some four years ago the last and most determined attack was made on the duties on steel in this country. A so-called "Steel Consumers' Association" was formed, petitions circulated, statements made and a very exhaustive hearing had before the Committee on Ways and Means. It happened that the question of the fitness of American steel for axes was quite thoroughly discussed. One of the largest manufacturers of axes in the country stated positively that he could not use American steel, and this was the cry of other ax manufacturers. Indeed, it seemed from the testimony that axes were the one thing for which American steel could not be made suitable. Now how is it? In the *Ironmonger* of Dec. 7, 1878, is an article on English and American axes, in which appears the following:

Quality apart, the newer axes (that is the axes made in England on the American pattern), however, are not yet cheap enough to induce the

members of the retail trade at home, exporters and importers over sea, to give them an extended trial, the fact being, we are told, that the Collins axes are actually being offered at lower prices, free in London, than English-made axes on the same patterns. The Collins 7-lb. axes are to be had here at something like 50¢ per dozen, net—large lots—whereas the best English made, which average about 6 lbs. each, cannot be obtained at anything under 1 per lb., or 75¢ per dozen, which price does not include charges for packing, as is the case with the "Yankees." It is self-evident that this ought not to be the case, and that if it is so here, where our manufacturers are on their own ground, it is likely to be much more developed in the colonies and elsewhere outside our own particular boundaries. The Collins axes in particular have a well-deserved reputation, and the success they have achieved can only be upset by offering equally good and well-finished articles at the same or lower prices.

To those who remember the hearing before the Committee of Ways and Means, this is a complete refutation of the arguments in favor of the reduction of the tariff on axes. Collins & Co. do not use a pound of foreign steel. Their entire consumption is made in their own factory, and yet, notwithstanding the assumed fact that the tariff is a tax, and that they have no drawback for duties paid on goods manufactured from imported raw material, they are exporting and selling a 7-lb. ax in London at 16¢ per dozen less than 6-lb. ax of, we presume, a somewhat similar pattern, the Collins ax being, we judge from the article, conceded to be as good as the English one, if not better. This shows two things: First, that American steel can be and is used in making an ax that competes in quality with axes made from English steel; second, that axes made from it can bear the freight across the Atlantic and still be sold lower than the English axes made from English steel. These unconscious testimonies to the truth of American industrial ideas and the quality of American manufactures, are more valuable than they would be if they were direct and positive.

The Siemens-Martin Discussion.

During the Paris Exhibition the Society for the Production of Martin Steel, successors to Emil and Peter Martin, distributed a pamphlet in which they claimed that the credit of having invented and perfected the open-hearth steel process belonged to Martin alone. Dr. Siemens, of London, demanded the retraction of this document and the substitution in its stead of a paper setting forth his claims of priority, the merits of his regenerative system, and honorably mentioning the perseverance of Messrs. E. & P. Martin in developing the process. Finding that this proposal was rejected by the company, Dr. Siemens published the entire correspondence, together with drawings, in pamphlet form. He states in one of his letters that he had worked at the solution of the problem of melting steel on an open hearth since the year 1850; that in 1861 he took a patent on it, which was put into practical operation by Atwood and by Messrs. Boignies, Rambour & Co., of Montluçon, France. He calls the attention of Messrs. Martin to the fact that on the occasion of his first negotiations with them, in a letter dated May 26, 1863, he informed them of the experiments at Montluçon. The further correspondence between the parties seems to show that the question of the application of the Siemens regenerative system referred only to a crucible steel furnace; that Siemens' idea of building an open-hearth steel furnace was a novelty to the Messrs. Martin, who, in consequence of Siemens' urgent requests, agreed to the condition that the furnace to be built was to be a reheating furnace, which might at a small expense be altered into an open-hearth steel furnace.

The first furnace at Sireuil was begun according to Mr. Siemens' plans on the 17th of April, 1863, and put into operation by his engineers. Mr. Siemens then acknowledges that after 1864 the Martins followed out the process with great perseverance, and that it was especially the proper admixture of the materials which they studied. It was only in 1867, after having concluded their experiments and begun regular work, that the Martins took a new patent, in which the main points of the open-hearth steel process were embodied, as they were also in the patent granted in the same year to Siemens. The Martin patent contains recipes for the production of cast steel capable of being hardened, of a homogeneous metal which will not harden, and of a "mixed metal," a mixture of cast iron and steel. These recipes do not now possess any practical value.

Some interesting data in regard to this question were brought out in a debate before the Bergu. Hüttenmaennische Verein für Steiermark u. Kärnten. Prof. Kupelwieser, in the course of this debate, stated that in his opinion neither Siemens nor the Martins originated the open-hearth process. He calls attention to the fact that Prof. Gruner, in a paper published in the *Annales des Mines* in 1868, mentions the description in an article in Hassenfratz's *Siderotechnik*, 1862, of a process used in an English iron works of melting cast and wrought iron in a reverberatory furnace, sampling, then ladling and casting. This process was taken up again, and in the years succeeding 1850 similar experiments were made by Col. Alexander at Brest—without result, however, because a very poor grade of pig was used. The process was not new either in France or in England. There is no doubt, however, that it could not be successful the less temperatures such as produced by un-Siemens regenerative furnace were employed. Both Prof. Kupelwieser and Director Sprung held that no royalties need

be paid in Austria on the Martin process. The following resolution, offered by the Chairman, Prof. Tunner, was passed unanimously:

1. The principle of the production of cast steel in a reverberatory furnace was known in England before the year 1812, and in 1860, Sudre, under orders from Napoleon III, carried it out quite successfully on an open hearth in the Montolone Works.

2. The idea of melting steel in the Siemens furnace originated with Siemens in the year 1862, and Martin built a reheating furnace which might be cheaply, according to Siemens' directions, altered into a steel furnace. In April, 1863, Siemens' engineers built the first Siemens-Martin steel furnace at Martin's works at Sireuil.

3. In the year 1864 Martin found the proper additions for various grades of steel, and received a patent on them August 15, 1865. The furnace shown in the drawing on this patent is identical with Siemens' construction, and Siemens' drawing was also added to the subsequent patent of August 1867.

4. Martin can claim priority for his additions only.

5. But as these additions have been entirely superseded by the manipulations based upon more recent experience, Martin's patent is without value.

6. As far as we know, Martin has been rejected in France also, nobody there paying patent royalties.

Whether all this has any interest for those using the Siemens-Martin process in this country is for them to determine.

The English Failures and Late Trade Statistics.

The continued financial troubles in England and the exemption therefrom in France, lend special interest to a comparison between the trade of these countries during the first ten months of 1877 and 1878. The following has been the general movement in merchandise from Jan. 1 to Nov. 1, in millions of dollars.

	England	France
1877.	1878.	1877.
Import.....	1,246	1,266
Export.....	830	811
		574
Total.....	2,476	2,377
		1,176
		1,283

It will be seen that while the imports into France increased 20 per cent. during the period named, English importations show a decrease of 5 per cent.; that French export decreased 4 per cent., and that of England only 2½ per cent.

Chief among England's imports we find the following items of raw produce, all showing a notable decrease, principally by reason of the enormous decline in values:

	1877.	1878.
Raw sugar.....	\$92,241,095	\$68,002,815
Cotton.....	143,962,695	135,724,760
Wool.....	113,177,010	105,705,195
Fax and		

AVERAGE COST PER TON OF PIG IRON ON FURNACE BANK, AND OF MERCHANT BAR IN MILL, FROM 1850 TO 1879.

COMPILED FOR *The Iron Age* FROM ORIGINAL DATA, BY MR. WM. E. S. BAKER, SECRETARY OF THE EASTERN IRON MASTERS' ASSOCIATION.

AVERAGE COST OF PIG IRON, 1850 TO 1879.

	1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878
	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1	Mar. 1
Cost of Ore to the ton of Pig Iron.....	\$ 5.75	5.44	5.55	5.97	6.65	7.51	7.50	7.75	7.66	7.08	7.45	7.35	7.08	7.49	9.12	18.13	19.19	11.71	10.92	11.86	12.96	12.67	13.64	14.57	14.75	11.95	9.54	7.69	6.51
Cost of Coal to the ton of Pig Iron.....	3.70	3.36	3.65	3.28	3.53	4.63	3.90	3.89	4.06	3.26	3.49	3.26	3.68	3.42	5.41	9.66	7.55	4.44	7.11	7.41	7.08	8.59	7.28	7.45	7.90	8.01	6.79	4.93	5.29
Cost of Limestone to the ton of Pig Iron.....	98	96	1.09	1.06	1.38	1.26	1.16	1.14	1.18	1.15	1.21	1.17	1.11	1.20	1.96	2.85	2.65	3.76	2.51	3.14	2.44	2.08	1.98	2.03	1.14	1.01	81	78	
Cost of Labor to the ton of Pig Iron.....	2.22	1.61	2.02	2.00	2.45	2.85	2.58	2.30	2.10	1.82	1.87	1.97	1.57	2.07	2.85	4.56	3.46	3.99	3.86	3.46	3.89	3.54	4.60	5.11	4.40	2.97	2.54	2.03	1.96
Cost of General Contingencies.....	1.65	1.93	2.03	2.62	1.99	2.62	2.91	2.16	2.73	2.83	2.88	2.67	2.35	1.66	2.01	2.03	1.98	1.90	1.96	3.67	2.77	2.98	3.00	2.39	2.10	1.73	1.65	1.29	
Cost at Furnace Bank.....	14.25	13.30	14.34	14.88	16.00	18.87	18.05	17.24	17.73	16.14	16.85	16.61	16.11	16.53	20.97	33.21	27.88	27.88	26.30	26.83	30.04	29.65	30.58	32.41	31.47	26.17	21.61	17.10	15.73
Add interest on capital on a product of 6000 tons....	1.05	1.05	1.15	1.22	1.37	1.29	1.21	1.47	1.22	1.28	1.36	1.57	1.40	1.59	1.61	1.64	1.80	1.63	1.71	1.85	1.82	1.75	2.08	2.00	1.70	1.50	1.26	1.15	
Total cost to the producer.....	\$ 15.30	14.35	15.49	16.10	17.37	20.16	19.26	18.71	18.95	17.42	18.21	18.18	17.68	17.93	22.56	33.82	29.52	29.68	27.93	28.54	31.89	31.47	32.33	34.49	33.47	27.87	23.20	18.36	16.87

AVERAGE COST OF BAR IRON, 1850 TO 1879.

	6000 Tons.																												
Cost of Pig Iron to the ton of Finished Bar Iron.....	\$ 25.65																												
Cost of Coal to the ton of Finished Bar Iron.....	5.70																												
Cost of Labor to the ton of Finished Bar Iron.....	10.43																												
General Contingencies.....	4.64																												
Cost in the Mill, finished.....	46.42																												
Add interest on capital on a product of 6000 tons....	1.56																												
Total cost to the manufacturer.....	\$ 47.98																												

Quantity of Ore used to make 1 ton of Pig Iron, average of 10 years..... tons, 2151.17

Quantity of Pig Iron used to make 1 ton of Finished Bar Iron, average of 10 years..... tons, 1041.13

Pig....13'00

Quantity of Coal used to make 1 ton of Pig Iron, average of 10 years..... " 1143.27

Quantity of Coal used to make 1 ton of Finished Bar Iron, average of 10 years..... " 1122.03

Coal....110'00

Quantity of Limestone used to make 1 ton of Pig Iron, average of 10 years..... " 161.06

Quantity of Limestone used to make 1 ton of Finished Bar Iron, average of 10 years..... " 600 Tons.

The above group of furnaces used Juniper and Montour Hematite Ores, and a little Cornwall.

The coal came chiefly from the Wyoming and Lehigh Valleys.

duce show the following increase of import:

	1878.	1877.
Wool.....	\$ 60,755,400	\$ 57,408,600
Silk.....	58,075,200	30,936,400
Cotton.....	37,565,200	34,939,600
Hides.....	33,588,800	24,974,200
Lumber.....	26,945,000	24,528,800
Coal.....	26,555,800	25,879,000
Seeds.....	18,391,200	16,023,000
Total.....	\$ 255,771,800	\$ 234,419,600

An increase of export is shown in the following items:

	1878.	1877.
Wool.....		

AMERICAN SCREW CO.,

Providence, R. I.,

MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,

AND INCREASING THE ASSORTMENT DAILY.

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a lower cost to the consumer than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION.

PHILADELPHIA, 1876.

(No. 235.)

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

REPORT ON AWARDS.

PHILADELPHIA, November 8, 1876.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED. Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bain,
Chas. Staples,

G. L. Reed,
J. D. Imboden,
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards.
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

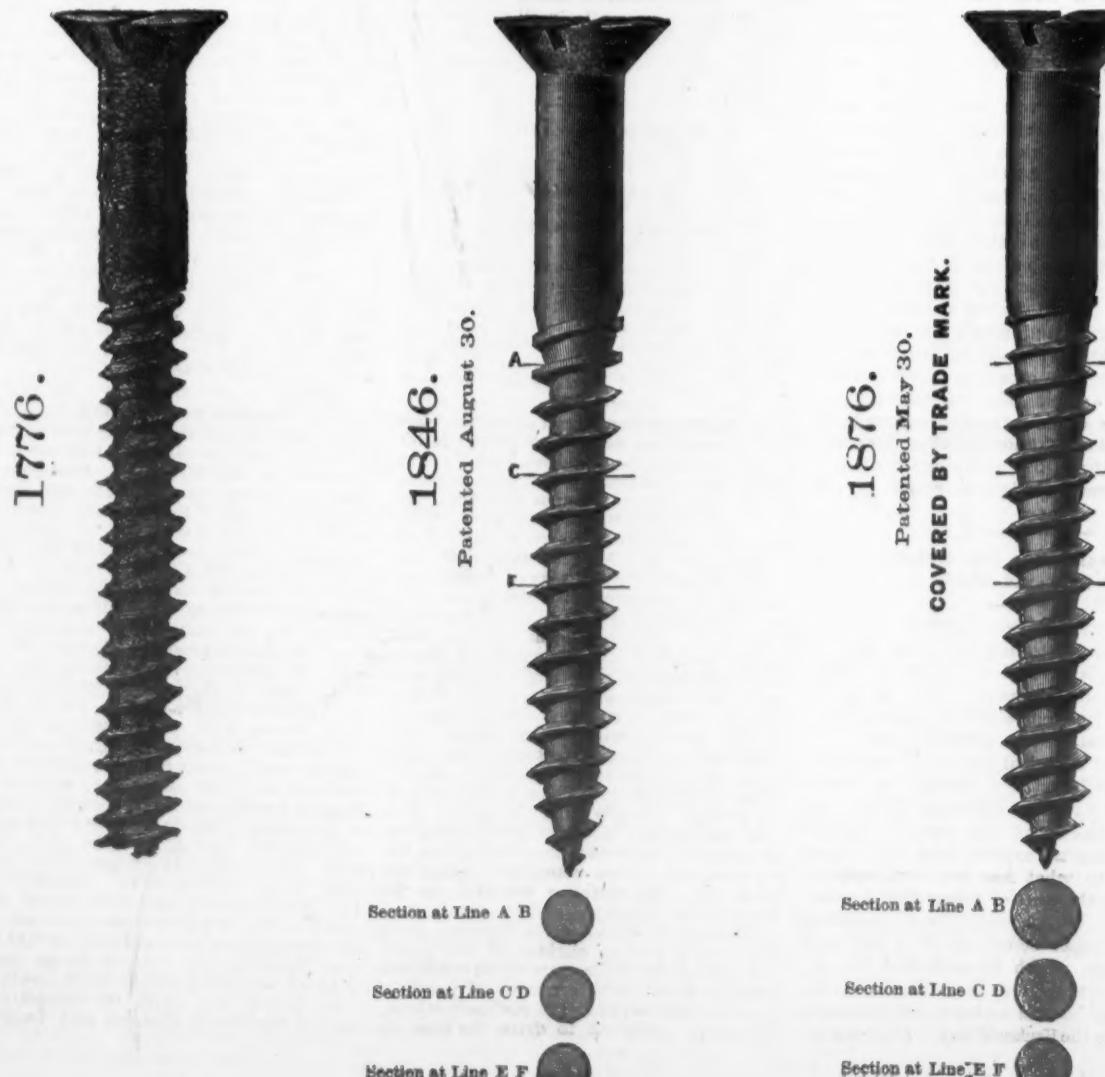
The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to style now adopted.

Experience has shown that the weak point of screws, as formerly made, is at the heel of the thread, where all



the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

ANNUAL REVIEW OF THE Manufacturing and Iron Industries of Eastern Pennsylvania.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, Dec. 30, 1878.

In presenting a review of the Iron interests and its branches in Eastern Pennsylvania, we have classified the various departments so that our remarks may be understood in their proper connection. Of the magnitude of these interests some idea may be formed from the fact that nearly 30,000 men are employed as iron workers in this immediate vicinity. For the extreme courtesy with which our inquiries have been met and for the valuable information furnished, we now tender our sincere thanks, and at the same time wish to one and all a happy and prosperous new year.

We have been impressed with a few general features which appear to be common to all branches of business, with one or two trifling exceptions. First, that there has been greater depression in 1878 up to about the 1st of September than at any time since the panic of 1873. Second, that prices have been gradually declining and are now lower than ever before. Third, that the idea of an important advance in values is not held by those who are regarded as the most experienced men. Their views are based on the ground of the increased purchasing power of money, or in other words, the readjustment of values consequent upon a return to specie payments. Another fact appears to be that capital has earned very little during the year, and in no degree proportioned to the risks of business. If the opinion that prices are to remain almost stationary is correct, there seems to be but one alternative by which to induce the investment of capital, viz., to cheapen production. This has been accomplished during the year under review to a greater extent than is generally supposed, in some cases by reduction in wages, in others by improved processes, and by new machinery. We have very specific information upon this point. To give details, however, would be manifestly unfair to the parties interested. We may state, however, that in certain staples in some of the branches under review necessity has been the mother of invention, and by the aid of machinery goods are now being turned out with a small margin of profit to the manufacturer at prices which a year ago would have been deemed scarcely possible. At the same time it may be said that lower prices are regarded as entirely out of the question. A correspondent, in an exceedingly interesting letter, writes as follows: "During the past three months there has been a greater demand than in 1877, with less persistent demands from buyers for lower prices. It seems evident that in my line of goods prices have declined to their utmost limit, and may be said to be very close to absolute cost in establishments equipped with the most perfect machinery and appliances." In regard to the business outlook the same correspondent says: "I anticipate that before midsummer of 1879 is upon us we shall all be surprised at the increasing demand for goods of reliable manufacture. I have been for several months, and am now, hard at work getting ready for the coming business."

The Export Trade.

There has been much misapprehension in regard to foreign trade. We have therefore made special efforts to obtain correct information upon the subject, and the views now presented have been derived from parties of undoubted standing and large experience. In many branches American manufacturers have been successfully introduced into the leading markets of the world, with every indication that they will maintain the position they now hold. Among these may be mentioned locomotives, sugar machinery, certain kinds of machine tools, agricultural implements of all descriptions, saws, edge tools and hardware specialties. It is not to be understood that every manufacturer of these articles can find a profitable foreign market, as many appear to think they can, by simply shipping goods to be sold for what they will bring. On the contrary, only a very few firms have been successful in securing a recognition, and then only by adapting their goods to the requirements of the market sought for, and by large expenditure of time and money. By way of illustration, having reference to this vicinity only, Baldwin Locomotives are now known the world over; sugar and other heavy machinery by such firms as James Moore, I. P. Morris Co., and machine tools by Wm. Sellers & Co. and W. B. Bement & Son; agricultural machinery by A. B. Farquhar; saws by Disston's; forks by Sheble & Fisher, are equally well known, and have a recognized position, but it is a great mistake to suppose that other manufacturers in the same line as any of the above can at once find an equally favorable market. Neither should it be understood that there is no room for enterprise outside of a few leading firms. There are others in a less prominent way of business, covering nearly every department, who have sold more or less goods for export, and those having specialties of real merit will also secure recognition in due time. The objection is in the method of seeking to obtain business, and for this class these remarks are specially intended. The risks and expenses connected with foreign business are too great to warrant its being sought for except by firms with large capital and who make this branch a specialty. Consigning goods through irresponsible parties, in anticipation of large returns, has proved a delusion and a snare. In many cases goods so consigned have not only been entirely lost, but have been offered in competition with the same articles legitimately exported, thus killing the goose that laid the golden eggs. Some good firms have attempted to sell direct, but lower prices had to be accepted than to the home trade, while remittances were never received in less than four or six months, and frequently twice that length of time. In many cases vexatious claims have been

made, while if the parties do not choose to pay there is but little chance of getting anything by compulsion. The growth of the foreign trade, therefore, will most likely be through established channels, rather than by indiscriminate shipments through parties of whom little is known to others of whom absolutely nothing is known. Referring to the export trade the correspondent previously mentioned says: "As to foreign trade, it has on the threshold discouraging features which might have been anticipated, but it has also encouraging features. It will not pay for every manufacturer to chase after a foreign market; the most of us must be content with home trade; but for those who make good articles at the lowest possible cost, to seek a foreign market is commendable, and I believe in the end they will find their profit in it. Government is helping through its consular and other agents abroad, but I think should help to establish and maintain for a time steam communication with all foreign countries wherever a remunerative trade might after a time be reasonably expected." Another correspondent writes: "We do very little in foreign trade, and think there are so many bummers and sharpers endeavoring to victimize the public, that many are disgusted with efforts in that direction." Still another says: "Foreign trade is yet in its infancy. There are too many trying to do an export commission business, and not enough who have knowledge and capital in the regular export trade. This throws the risk solely upon the manufacturer, who ought to bear only a part of the burden."

Iron Ships.

Business during 1878 has been fairly active, showing in the early part of the year a tendency toward improvement which, however, for the time being is not sustained. The total tonnage of iron vessels launched on the Delaware during the year may be placed at about 25,000 tons, and the value at about \$5,000,000. At the works of John Roach & Son, Chester, Pa., the following steamships have been completed:

Oregon registered tonnage..... 2,325

City of Rio de Janeiro, registered tonnage..... 3,548

City of Para, registered tonnage..... 3,532

Saratoga, "..... 2,426

City of Columbus, registered tonnage..... 1,992

Gate City, registered tonnage..... 1,997

Juan Mir, "..... 493

and two ships now on the stocks not yet named, one about 2,450 tons and another 2,850 tons.

At Wilmington, Del., something has been done in river steamers and tugs, but we have not been able to obtain details. A leading firm there writes us that "relating to work turned out, we are sorry to have to advise you that we have nothing worth reporting."

In Philadelphia business has been unusually active, largely, however, on account of work on steamships sold to the Russian government. Wm. Cramp & Sons have employed from 1,500 to 2,000 men during a large portion of the year, and have launched one first-class steamship and one smaller steamer. The work of overhauling and refitting the California and the Columbus has, however, been almost equal to building new vessels. Neafie & Levy have done a large amount of work, as follows: A tug-boat, 60 x 14 x 6.6 feet, with high-pressure engine, 14 x 16 inches; a tow-boat, 100 x 21 feet, with low-pressure jet condensing engine, 20 x 26 inches, for the New York and New Haven Railroad Company; a steamship, 211 x 32.6 x 21.6 feet, double deck, with low-pressure, surface condensing compound engine, 30 inches diameter high-pressure cylinder, 50 inches low-pressure, and 36 inches stroke, schooner rigged, with two masts, for freight and passengers for the Havana coasting trade. They have also on the stocks a tow-boat, 80 x 17 x 9 feet, with high-pressure engine, 24 x 22 inches, not yet named, for use at the jetties at New Orleans. They have also built a wooden vessel, 160 x 27 x 9.6 feet, with surface condensing engine, 30 x 34 inches; the machinery for a ferry-boat for Baltimore, 34 inches by 9 feet; for a freight boat, 18 x 18 inches; for the steamship Morro Castle, altered from a side-wheel to a propeller ship, engine, 50 x 60 inches, and have just closed the contract for a new wooden steamer, 163 x 24 x 15 feet, with surface condensing engine, 24 x 24 inches. There are also one or two other small establishments, but the amount of work done is not important.

Chains.

In this connection we may refer to this trade, associated as it is with shipbuilding. Bradley & Co. of this city, who claim to make the heaviest chains in this country, report as follows: "The volume of the chain business has been about the same as last year. Prices have been considerably lower and margins almost imperceptible." This firm have just completed a marine railway chain of 2 1/4" iron, 350 feet long, for Charles-ton, S. C.; also have just completed a large order for the Lighthouse Department at Charleston of 2 1/4" stud chain; have also furnished the chain for the Russian vessels at Cramp's, and for the vessels built at Chester, and are now working on chains for the new iron vessels building at Neafie & Levy's. Also made 800 feet 2 1/2" marine railway chain, and 400 feet 2 1/4" ditto, and 125 feet 3 1/4" chain, which is the largest chain yet manufactured in the United States.

Bolts, Rivets, &c.

In this line we find an average increase of from 10 to 15 per cent. in weight as compared with 1877. The usual complaint of low prices is no exception among manufacturers of these goods. It is thought that bottom has been reached, however, and 1879, it is anticipated, will be a good year. Some foreign trade is being done, but it is found difficult to compete with the low prices of European goods.

Locomotives.

Business during the year has shown quite an improvement; actual statistics indicate an increase of over 60 per cent. as compared with the preceding year, the output at the Baldwin Works being 185 locomotives in 1877, against something more than 300 during 1878. Forty of these, however, on Russian account, may be regarded as exceptional. Another portion of the increase is due to orders from the elevated railways, and to some extent, also, to the introduction of street motors. Making due allowance for these, however, a clear gain of 35 to 40

per cent. has been established in ordinary business as compared with the previous year, while a large portion of the increase has been obtained during the last six months. The Baldwin Works, in course of the current year, have received orders and made shipments of locomotives to Brazil, Peru, Cuba, Nicaragua, Russia, Norway, Italy, Australia and New Zealand, with results that seem to indicate the establishment of a permanent trade with all these countries. Within the past week an order has been received from Brazil for six narrow gauge locomotives, and the outlook generally is regarded as fairly encouraging. Prices have had a shrinkage of fully 50 per cent. during the past five years. Locomotives which cost \$10,000 in 1873 can now be bought for \$5,000. Cost of production has decreased largely, but not in proportion to selling prices. The company have just shipped to the far West what is probably the most powerful locomotive ever built, its capacity being estimated at 2,500 tons on a level. For the time being street motors seem to have lost their popularity, although we notice in the Baldwin Works one being built for a street railway in Dunedin, New Zealand, and another for Brooklyn, New York. The low price of horses and horse feed, as well as an indisposition during these stringent times to make any changes involving outlay, is the chief cause of apathy in regard to street motors, but they are a demonstrated success, and will no doubt eventually be brought into general use. Average number of men employed upward of 1,500. The firm have just received by cable an order for nine of the largest size locomotives, showing the opening of business in a field of great importance.

Car Building.

This industry is one of great importance, and in Wilmington, Del., Philadelphia, Harrisburg and York, Pa., upward of 4,000 hands in good times are directly engaged in the car shops. At present 2,000 to 2,500 would probably be a more correct estimate. The position of the trade and the character of the communications are such, however, that details are not considered advisable. The demand for passenger cars has not been large, although important progress has been made in securing recognition in foreign markets, and there is no doubt that a permanent and increasing business will be maintained.

In freight cars there has been a large amount of work given out, and with one or two exceptions a considerable increase of business is reported as compared with the previous year. The foreign demand is steadily increasing, and in some cases large establishments have work of this class sufficient to occupy them for weeks to come.

Car Wheels.

This branch of business is developing new fields, and notwithstanding the fact that one or two railway companies are making their own wheels, about an average number have been sent out by firms engaged solely in their manufacture. A. Whitney & Sons have had some of their chilled cast-iron wheels, 38 inches diameter, under test in England by the Great Eastern Railway Co. since February, so far with completely successful results. We are informed that the American wheels have not hitherto been able to find a market in England on account of prejudice against the use of cast iron for that purpose, but the prospects now seem to be more favorable. American wheels are sold largely for street-car and similar purposes, and prospects for foreign trade are considered encouraging.

Steel Tires.

A largely increased business has been done, as compared with 1877, and prospects for the ensuing year are said to be quite cheering. The Standard Steel Works have increased their output over 50 per cent. as compared with the previous year. We have no official information from the Midvale Steel Works, but they are understood to be full of work and to have made a large advance on the output of 1877.

Scales and Testing Machines.

Riehl Bros. report that they made more scales during 1878 than during any one year for some time back, and more testing machines than in any one previous year. The outlook is considered good for both branches of business, especially for railroads and iron works, who are beginning to renew their scales, &c. A large number of railroad scales have been put in during the year. In testing machines may be mentioned one of 150 tons capacity for Bradle & Co., one of 100 tons for the C. B. and Q. Railway Company, and others. One also has been ordered by Dr. C. W. Siemens to go to England; another by Capt. W. B. Eads for New Orleans. They have a fair amount of work on hand, and prospects of an increased business next year.

Heavy Machinery.

Intimately connected with railway interests are firms engaged in the manufacture of machine tools. Wm. Sellers & Co., W. B. Bement & Son, Harrington & Son, and Ferris & Miles may be regarded as representative firms in this line. Details, for obvious reasons, are not easily accessible. That considerable improvement has been realized during the year past is beyond doubt. Compared with equal date of last year the outlook is admitted to be very encouraging, while the amount of work done shows a steady increase. Foreign trade is gradually developing, the orders secured some time ago from Australia alone by Wm. Sellers & Co. being estimated at over \$50,000. In another branch, such as sugar machinery, mining machinery, cotton presses, rolling mill equipments, &c., a steady increase of business is reported. James Moore, the I. P. Morris Company, the Reading Iron Company (the two last named especially) and others report a considerable improvement during the year, with still better prospects in the immediate future.

Light Machinery

and special tools, such as lathes, valve seat planers, cylinder boring machines, &c., a decided improvement is noticed. Israel H. Johnson, Jr., & Co. supplied the engineers' department of the Russian steamships with lathes, and other tools of the same character have been sent to distant countries. The L. B. Flanders Machine Works have had orders for their special tools from South America and the Pacific coast, besides a considerable amount of local work. In

Steam Engines

business has been far from satisfactory. Robert Wetherill & Co., of Chester, Pa., and Chas. W. Ervien & Co., Jacob Naylor & Co., and Campbell & Rickards, of Philadelphia, make almost identical reports, viz., that business has fallen off compared with 1877, and prices too low to leave any margin for profit. Buyers of late have been more than usually prepared to pay cash down, and have therefore bought very close. Among the larger engines built during the year may be named those at the Girard College, by Wetherill; Eagle Mills, Manayunk, by Ervien; Midvale Steel Works (extra heavy and strong for 12-roll train), by Naylor; and N. & G. Taylor Co., by Campbell & Rickards. The last named have also built two steam hoisting cranes, each to lift 30 gross tons, for McNeals & Archer, Burlington, N. J. As an indication of the shrinkage in values, we have been informed by one of the above firms that steam engines selling for \$120 three or four years ago now only bring about \$70. Prospects of increased business are encouraging, as inquiries are numerous and from a good class of buyers. Charles W. Ervien & Co. have orders on hand for several steam engines for mining purposes in California, and have recently shipped five of this class to San Francisco. In small power engines quite a number of sales have been made on foreign account. Lovegrove & Co. report sales of this class of engines during the year for shipment to Australia, India, Cuba, South America, and inquiries from Russia and other parts of Europe.

Elevators.

Stokes & Parrish, who make this class of work a leading specialty, report an increase of business equal to about 50 per cent. as compared with 1877. They have employed more hands, but the principal increase has been derived from improved facilities in manufacturing. They have built a large number of elevators during the year for hotels, warehouses, &c., in New York, Baltimore and Philadelphia; also hydraulic elevator for the Glamorgan Iron Works, six hoists for the Standard Oil Company and two double drum hoists for the government and two double drum hoists for the government.

Shafting, Pulleys, &c.

This class of trade is of large dimensions in Philadelphia, and is chiefly in the hands of such firms as Wm. Sellers & Co., Thos. Wood, Geo. V. Cresson, Yocom & Son and one or two others. The report in this branch denotes a decided improvement, probably 25 per cent. as compared with 1877. The outlook is also said to be encouraging, although prices are very low. The export trade shows steady growth.

Belting.

Philadelphia holds a prominent position in this class of trade also, and the products of the leading firms are distributed in all parts of the Union, and to some extent in foreign markets. Business during the year shows some falling off as compared with 1877, but during the past three months there have been encouraging signs of improvement. Since 1873 prices have declined 20 per cent. and during the past year about 5 per cent. It is believed that bottom has been reached, and a larger business at better prices is expected during 1879.

Agricultural Machinery and Implements.

This branch of trade is one in which it may be fairly claimed that the United States leads the whole world. In Pennsylvania there are a few representative manufacturers, such as A. B. Farquhar, of York. In a brief synopsis of the year's business, Mr. Farquhar writes us that "the increase in bulk has been 50 per cent., and in value about 33 1/3 per cent., giving employment to about 25 per cent. more hands than in 1877. Prices declining and profits small." Sheble & Fisher and Myers & Ervien, the well-known manufacturers of forks, &c., make a very similar report. Their export trade is increasing, but prices are low and leave very little margin for profit.

Hardware.

The firms engaged in the manufacture of such goods as are sold by hardware merchants, employ in this vicinity upward of 4,000 men, Henry Disston & Sons leading with 1,000. Reading Hardware Co., Enterprise Manufacturing Co., Carr, Crawley & Devlin, B. Rowland & Co., Welsh & Lee and American Machine Co. also each employ a large force. There are other firms employing from 10 to 50 hands each, making a total, as above stated, of about 4,000 men.

In specialties controlled by such firms as the Enterprise Manufacturing Co., the American Machine Co. and others, business shows steady growth. In builders' hardware and heavy goods generally prices have been cut extremely low, and manufacturers claim that profits have been out of all proportion to the capital invested. The number of hands employed in these branches has been about 10 per cent. greater than in 1877. Foreign trade has steadily increased, with excellent prospects of its continuance. Some firms report an increase of 50 per cent. in their foreign trade.

Saws.

We have no special details in regard to the saw trade, but we understand that it

shows a fair average increase. The yellow fever for a time cut off a considerable amount of business in the Southwest, but in other directions there has been a steady increase, particularly in long saws.

Files.

An important increase is reported in the amount of goods turned out, but prices have been too low to leave any reasonable margin of profit for the manufacturers. Orders for files have been received from nearly every country in Europe, as well as the British colonies and South America. Whatever the condition of business may be elsewhere, the Philadelphia file trade has certainly made a rapid advance during 1878.

Shovels.

Total number of building permits: For

1876, 5380; 1877, 6273; 1878, 4269.

Pig Iron. During eleven months of the year the tendency of the market has been steadily downward, and only within the past few weeks has there been any change. The suspension of the Allentown Iron Company seemed to arrest the decline, since which the market has been steady and at times firm. The average decline during the year may

command a reasonable price. The export trade is increasing, but as a rule manufacturers deal with parties on the spot, selling at low figures in preference to taking risks at a distance.

Edge Tools, Hammers, &c.

There is nothing calling for special

placed at about \$1.50 per ton, although occasional transactions have been noticed showing \$2.50 to \$3 below the lowest figure of 1877. These were exceptional, however, and only in the case of lots forced on the market to realize cash. During December the market has been free from obstructions of this character and transactions usually at about quoted rates. Business has been confined to small lots, however, and it is yet to be seen how the market will bear up without the support of large buyers. There is a disposition to increase production somewhat, based upon anticipations of larger demand, but consumers show no anxiety in regard to the future, and appear quite willing to take their chances of the market. In several instances purchases have been made with deliveries extending up to May, and in one or two cases we know of transactions covering all 1879, all based on prices current at this date. From these contracts it may be inferred that prices are not likely to vary much either one way or the other. As to the cost of Pig Iron we are indebted to Mr. W. E. S. Baker for the figures now furnished on page 15, from which it appears that \$16.88 at furnace bank is about the average cost per ton at this date. A careful examination of these figures show that in 1850-1-2 and 3 Pig Iron was produced at an average cost during the four years of \$15.30 per ton. The next period of low prices was in 1860-1-2 and 3, when the average for four years was \$17.85. The average cost for 14 years, say from 1850 to 1863, is shown to be \$17.50 per ton. A careful analysis of these figures will be found at this time very suggestive. Coal seems to be the item showing the greatest discrepancy, and at the present low price is \$1.40 per ton of Iron dearer than the average of the 14 years from 1850 to 1863. With the return to specific payments a general marking down in values is looked for, and if everything else shrinks to ante-war prices why not coal? A reduction in coal to the average of the price for the 14 years, as above shown, would reduce the cost of Pig Iron to \$15.24, about the same cost as the average previous to the war. There are very few men of experience in the trade who predict much advance in prices, and there are not a few who think we have not yet seen the lowest, and there is no doubt efforts toward cheapening cost will have to be made in the direction indicated. There is another serious disadvantage which Eastern ironmasters have to meet, viz., that of freights. We have not been able to obtain the exact figures, but we have been informed on good authority that there has been no change in local rates for years past, while freights to distant points have been cut down all the way from 30 to 60%. Whatever shrinkage there has been in freights has not been to the advantage of the Eastern Iron trade, but the reverse. As shown in another column, all kinds of railway equipments are now supplied at greatly reduced prices—locomotives, 50%. Rails show a still greater decline, as also all kinds of tools and machinery, and the ironmasters seem to have just cause for complaint in the matter of freights. Stocks on hand are believed to be somewhat lighter than at equal date in 1877, but there are several large blocks on hand which the trade would like to see absorbed. These are supposed to be in strong hands, however, and not likely to come on the market unless something unforeseen occurs. A larger volume of business is anticipated during the coming year, and it is hoped with more satisfactory results to producers than in the past two years.

Structural Iron.

The year just closed has been one of great activity, and the leading firms engaged in this department have been almost continuously employed up to their fullest capacity. The Phoenix Iron Company, the Pencoyd and others have made a large advance in the output of their product as compared with 1876 and 1877. Actual figures are difficult to obtain, but we have been informed by one of the firms named that their product during the first eleven months of 1878 was 3000 tons greater than during the whole of 1877. A safe estimate of the average increase of business in special shapes would probably be from 25% to 35%. The consumption of raw material by this class of trade has been a strong support to the Iron market, and it is encouraging to note that the outlook denotes a continued active demand. The construction of the Elevated Railroad in New York has absorbed upward of 30,000 tons of Iron to date, while some of the mills have still enough work on hand to employ them during the next three or four months. Bridge building and ship building has caused a large demand, as also to some extent for architectural purposes. Prices have not been satisfactory, however, and it is said that an immense amount of work has been done with scarcely any margin for profit. Prices have varied considerably, according to circumstances. Angles and Tees are probably \$2 to \$5 per ton lower than they were a year ago, but Bars are without change, a 2000-ton order having been placed during the current month at about \$2.47 1/2 per ton, same price having been accepted a year ago for a similar lot. At the moment there is but little inquiry, and parties are complaining of dullness, but after the holidays it is expected that business will take a new start.

Plate Iron.

The year now closing has on the whole been an improvement on 1877. A large amount of Plates have been consumed during the year, and at times sellers have been pushed to their utmost to make deliveries on time. Prices have been unsatisfactory, however, and manufacturers claim to have been sometimes compelled to accept orders at bare cost in order to keep their mills running. The lowest prices seem to have prevailed during the summer months, and were fully \$5 per ton below anything accepted during 1877. Toward the close of the year prices stiffened up somewhat and were quoted \$2 to \$3 higher, but there is very little demand and the market is weak and irregular. A dull time seems inevitable during the next month or two, and there is little doubt (unremunerative as prices are said to be) manufacturers will be quite willing to accept orders for the present at same prices as current during 1878. A compari-

son of quotations, based on sales made a year ago, with those of to-day, show a decline of about \$2 to \$3 on average lots.

Sheet Iron.

A large amount of business has been done during the year, and the mills, as a rule, kept busy to their full capacity. This, however, has not prevented a decline in prices, although there are evidences which seem to show that rock-bottom has at last been reached. The last half the year developed a large trade, but it seemed impossible to obtain any advance in prices, although manufacturers firmly refused any concessions further than had been made during the early part of the year. Stocks have been reduced to an unusually low point, and the trade may be said to be in a fairly healthy condition. A comparison of prices with those current a year ago shows an average decline of about \$3 per ton, more in some descriptions and less in others. A consideration of the past season's business, after stock-taking, &c., will no doubt determine the course of the market during the next few months.

Bar Iron.

Business during the year has been very much depressed, and prices most unsatisfactory. Western manufacturers seem to have special advantages in the way of low freights, while Eastern manufacturers find the rates prohibitory so soon as they attempt to reach Western markets. It is a matter of frequent occurrence for surplus stocks to be thrown on the seaboard markets irrespective of cost; hence a competition which it is difficult to meet under ordinary circumstances. The local mills have been at a further disadvantage owing to the abandonment of classification, and prices have therefore been very irregular and unremunerative. During the summer a reduction of wages was demanded by the employers, which after a nine weeks' strike the men were glad to accept. The position of the manufacturers has not been improved, however; indeed, complaints are as numerous before that it is impossible to realize anything over first cost at prices usually obtained. There has been a much better demand during the past few weeks, and it is thought an increased consumption may be expected during the coming year. At present there is not much chance of an advance in prices, although it is hoped something may be done to prevent continued cutting in extras. The decline during the year has been about \$3 per ton on Best Refined Iron. Common is quoted same as a year ago, say \$34 @ \$35 per ton.

Steel Rails.

The Steel trade on the whole has been entirely satisfactory, the advance during the first six months of the year being about \$4 per ton. The rate quoted in the early part of January was \$40 per ton, and in July \$44. Prices were well sustained until about Oct. 1, when the demand began to slacken, and under a gradually weakening market quotations settled down to about \$42, with a few sales at \$41, and in one or two cases still lower figures were accepted. The retrograde movement in prices is not the result of a falling off in the demand, but owing more particularly to the character of the orders, which have been chiefly for large lots, for such deliveries and terms as make them specially desirable. During the past two months it is estimated that nearly 200,000 tons have been placed, and it is understood that the mills now have an average of four months' work on hand, which may be expected not only to prevent any decline but rather to advance prices, as in the past year. Most of the mills are asking higher prices already, and there is but little probability of sales being repeated at the low rates accepted two or three weeks ago.

Iron Rails.

Taking the year through some little improvement may be noticed, both as regards prices obtained and quantity of Rails manufactured. During the early part of the year prices ruled very low, and sales at mill were made at \$30, and in one or two cases even lower prices were accepted. With higher figures for Old Rails and a more active demand generally, prices have been gradually stiffened, until \$32 became a minimum figure, and for good Rails \$33 @ \$34. During the past three months orders have come in very freely, and the mills have been steadily employed, it is supposed at a small margin of profit. A reference to our review of business of 1877 shows a remarkable uniformity with that of 1878, the lowest and highest prices having been precisely the same in both years. The low prices, however, in 1877 were toward the close of the year, while in 1878 the lowest prices were in the early part, and the highest toward the close of the year. From the present standpoint it would seem as though the lowest point of depression was passed several months ago. The outlook is also more satisfactory than a year ago, most of the mills having work on hand to last some time, while the prospects of good orders at an early date are quite encouraging. The demand for light Rails on Cuban account has been continuous, and with a settled condition of affairs in that country an increasing business is anticipated. There is also a probability of a large order from the Southwest being on the market in course of a few weeks, so that on the whole it may be safely asserted that the Iron Rail trade is in a healthy condition.

Old Rails.

The course of the market during 1878 has been very similar to that of the previous year. In 1877 the market opened at \$21, declined steadily until prices reached \$19 in July, and from that figure were held steadily until \$20 was reached in December. In 1878 the market opened firm at \$20, gradually weakened again until July, when they were sold as low as \$18. During the next three months they again advanced until \$20.50 was reached in October, and at about that price have been steadily held until the present date, with \$20 as the lowest quotation named to-day. Comparing the price of Old Rails with Forge Iron, we find, in December, 1875, a difference per ton in favor of Old Rails of \$2.50; in 1876, \$2; in 1877, \$3, and in 1878, \$5. It is difficult to predict what the course of the market will be during the coming year, although from present indications prices are likely to be

held steady. A good many Old Rails will no doubt come on the market in spring, but they seem to be in such constant demand as to prevent much accumulation except very temporarily. It is also understood that Steel Rails have been so generally used within the past few years that the quantity of Iron Rails to be taken up will be reduced to such an extent as to materially affect values. Much will depend, however, upon prices in other departments of the Iron trade, but it is likely the margin of \$5 between Old Rails and Forge Iron will be fully maintained.

Mining and Mineral Items.

COAL.

The Dell Roy Coal and Coke Company, of Cleveland, Ohio, was incorporated Saturday, the 21st ult., by Charles B. Stuart and others, with a capital of \$100,000.

The coal works of D. B. Ashbaugh, at Leechburg, Pa., are running full time, giving the men steady work at 50 cents per ton.

The Sippo Coal Company, located at Massillon, Ohio, with \$40,000 capital, was incorporated at Columbus last Wednesday week. Clement Russell, John E. McLain, John G. Warwick, Kent J. Chase and Milton Wilson are the incorporators.

The Uniontown (Pa.) Standard says: Frick & Co., of Brondford, have about concluded the purchase of Sherrick & Marke's coke works at \$50,000, and are also negotiating for the works of Boyle & Hazlett, Mt. Pleasant. This same firm, Frick & Co., leased the coke works of W. D. Mullen, and took possession on December 1. They now control over 1000 ovens. The Ferguson works, belonging to same firm, have been undergoing repairs, and some of the ovens are already fired.

During the month of November there were shipped from Straitsville 4170 cars of coal, of which the Straitsville Central Mining Company shipped 1057 cars, or daily average of 40 1/2 cars; by the Straitsville Coal Company, 1049, or an average of 40 cars per day; by the Consolidated Mining Company, 807, or a daily average of 32 cars; by J. S. Doe & Co., 422 cars, an average of 16 cars; Patterson Coal Company, 390 cars, average 15 cars; Kinkaid, Mitchell & Co., 344 cars, average 13; J. H. Tucker, Straitsville, 101 cars, average 4 cars.

The miners at Lonaconing, Md., are nearly all shut down for the winter.

COPPER.

The Houghton Mining Gazette publishes the following relative to this year's copper production in the Lake Superior district: The last shipment of copper was made on the 24th ult., which cleaned up the production of our mines for about the past twelve months. The yield of copper on the lake for the year ending with the above date is a few hundred tons in excess of the corresponding time last year. The notable increase is in the case of the Calumet and Hecla, which afforded in the neighborhood of 1600 tons more mineral. The Franklin yield is about 200 tons greater. From what information we have at hand now, the yield of the Atlantic, Quincy, Osceola, Allouez, Central and Pewabic mines will be nearly the same as last year. The Phenix yield is somewhat less. Ontonagon county has probably held its own.

PRECIOUS METALS.

Dividends last month have made a better showing. California surprised its friends on Monday, the 16th, by coming out with \$540,000. Standard has declared \$50,000, Bodie \$50,000, Eureka Consolidated \$150,000, and Golden Star, a new Arizona property, \$25,000—a total of \$815,000. The California dividend is regarded rather in the light of a Christmas present to the stockholders than a permanent resumption. The mine last month hardly produced the amount of the dividend, to say nothing of expenses. The Silver King of Arizona, about which so much has been written in praise, paid no dividend last month, nor has any yet been declared this month.

New discoveries of rich silver deposits continue in the vicinity of Leadville. Among the latest and most remarkable is one made by Lieutenant Governor Tobar, on Saturday morning, the 7th ult., of a sand carbonate vein, from which \$5700 were taken that day, and the discovery of very rich deposits on the Ten-Mile Creek, where a fissure vein 17 feet thick is reported. By an examination of the D. & G. Railway books for November, it appears that nearly 2,000,000 pounds of base bullion were transported from Leadville by that route in November, and upwards of twice that quantity of high grade silver ore. The shipments from Colorado Springs alone in November of base silver bullion were 1,025,000 pounds. It is evident the product in silver of the Leadville mines will very largely exceed any estimates heretofore published.

The Philadelphia Inquirer prints an account of an interview with President Gowen, of the Philadelphia and Reading Railroad Company, in which Mr. Gowen says that he accepts the result of last week's meeting as an indication that there will be no combination made for next year. He does not, however, think this need visit disaster upon the coal trade of Pennsylvania. While admitting that his company would doubtless make more money next year with the combination than without it, he believes it will do a heavy business at fair prices; and that, if others will follow the example of selling all the coal they can at the best prices obtainable, there will be little cause for dissatisfaction. He says his company is about to enjoy an advantage it has not heretofore had in a winter outlet for coal to the harbor of New York, which will be furnished through connection with the Bound Brook and New Jersey Central roads. He further says his company may also be enabled to run over the Camden and Amboy road, in which event it is probable that the company will have the largest winter coal traffic it ever had. The prospect is, therefore, quite encouraging.

The glass-chimney factory of Plunkett, Ihmosen & Co., Southside, Pittsburgh, has shut down until after the holidays.

ESTABLISHED 1849.

INCORPORATED 1876.

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THE BRADSTREET COMPANY,

Proprietors.

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CONSTANT REVISIONS AND PROMPT NOTIFICATIONS TO SUBSCRIBERS.

To Merchants, Manufacturers and Bankers:

We shall issue the Forty-fourth volume of our Reports during the first weeks of January. We submit this edition with confidence, as it has been revised with unusual care and great expense. We are determined to spare no effort to make our work complete, comprehensive and reliable; and to this end we have perfected many improvements which will appear in the January volume, but which have never heretofore appeared in any Commercial Reports. In consequence of the repeal of the Bankrupt Act, we have compiled an abstract of the Collection Laws of the several States which we print under the proper headings. The compilation of these laws has been made by representative attorneys in each State, and may be relied upon. We believe this feature will be appreciated by all who have occasion to grant credits covering different sections of the country. Inasmuch as our books are published quarterly, we shall be able in future to give any amendments to these laws, down to the very latest date.

We have also introduced under each town or village head concise information, showing its actual or relative position—whether on a railroad, steamboat, or stage route—the population, and whether a telegraph, express, or money-order office, and if without a bank or banker, the nearest place where collections may be sent. As a Shipping, as well as Collection Guide, this will be almost invaluable, it being more comprehensive, and we intend that it shall be more reliable than any published otherwise. We have also tabulated the Banks and Bankers throughout the United States and Canada, giving their capital, &c., as well as their New York correspondent, which we publish as an appendix to each volume, retaining, however, the names as they appear at present under their respective town or city in the regular volume.

These improvements are but an index of what we intend to do for our patrons in the future. Owning and directing our whole business, from London to San Francisco, as from Montreal to New Orleans, we are able to control it in all its branches, so that it is not possible for the interests of our patrons to suffer from conflict with local managers.

Relying solely on the merits of our work, we respectfully solicit an examination of our system, with the assurance of our ability to substantiate all we claim, and with the knowledge that it is worthy of your earnest consideration.

CHARLES F. CLARK, President.

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FIRE BRICK
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NEW YORK.The largest stock of Fire Brick of all shapes and
sizes on hand and made to order at short notice.Cupola Brick, for McKenzie Patent,
and others. Fire Mortar, Ground Brick, Clay and
Sand. Superior Kaolin for Rolling Mills and foundries.
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from my own mines at New Jersey and Staten
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Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire
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Manufacturers of Clay Retorts, Fire Bricks, Ga
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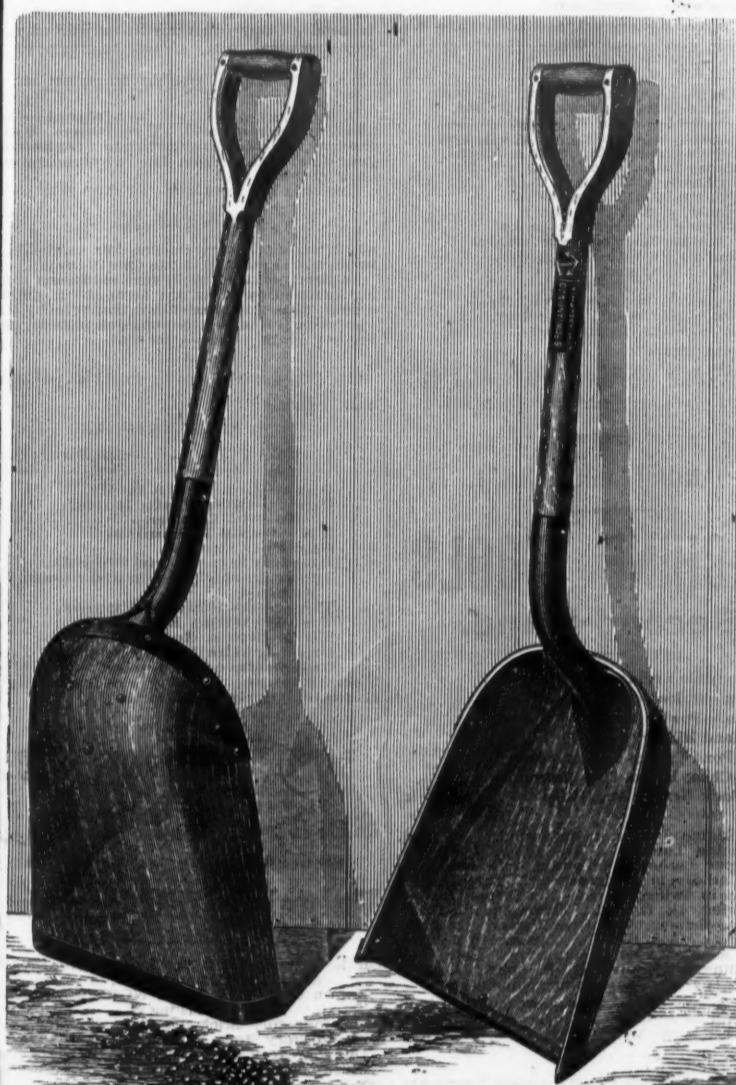
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We would call the attention of the trade to the above new article of our manufacture, and to its many advantages over the Steel Blade Scoop heretofore used for the same purpose, advantages which we think are destined to make it of universal use for the shoveling of grains of all descriptions, as well as for potatoes, apples, etc.: First, as to its weight, which is a little more than one-half that of a steel scoop of the same capacity, consequently it can be handled more rapidly and accomplish more work in a given time; second, as to its appearance—it is more slightly, being of a graceful shape, and constant use has the effect of giving the wood a beautiful hard polish, causing it to penetrate the mass of grain readily and deliver its load promptly. It balances perfectly in the hands, is thoroughly braced and guarded with iron at all exposed points, and is fully as strong and in some respects more durable than the steel scoop used for the same purpose. One trial will insure its future use to the exclusion of all others.

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INDUSTRIAL ITEMS.

VERMONT.

At a late special meeting of the stockholders of the St. Albans Iron and Steel Works, W. C. Smith, F. S. Stranahan, C. W. Rich, H. R. James and Cyrus Bishop were appointed a committee with full power to endeavor to relieve the company of its present embarrassment; to negotiate a loan, by mortgage of property or otherwise, to pay the debt of the company, or to sell the property, as they may deem best.

MASSACHUSETTS.

The E. Stebbings Manufacturing Company, of Springfield, which has recently been reorganized and put upon an enduring foundation with President Geo. C. Fisk, of the Wason Manufacturing Company at its head, was founded in 1848, and, after the burning of the old works, formed a new corporation and erected its present buildings some three years ago. The outlay at that time contemplated growth in the amount of work in all departments. The foundry is now finished and is a model one. The establishment produces all kinds of brass goods and makes a specialty of the finest brass and composition castings. Work is done for Colt's armory, the New Haven Arms Company and the United States Government. H. M. Brewster, for the last seven years connected with Hayden, Gere & Co., of Haydenville, has taken the agency of the company.

The Richmond Iron Works, West Stockbridge, Berkshire county, have set a number of their choppers at work, getting ready to burn charcoal this winter in considerable quantity, and the furnace is to be started next spring.

The Fall River Iron Works have contracts for two months ahead, which afford work for 500 men. The nail works have a capacity of 120,000 kegs per annum, and 104 kinds of nails are made.

The Knowles Steam Pump Works of Warren have a large contract with Salt Lake City parties to furnish two huge pumps for emptying silver mines. One pump is to have a 44-inch steam cylinder and a pumping capacity of 3,000,000 gallons daily, while the second will be larger yet. As the first machine must be ready in six weeks, extra machinists are to be hired and the shops run day and night.

NEW YORK.

The Troy mills have been troubled with high water during the recent storms, causing partial stoppage at some of them.

The Syracuse Chilled Plow Company are building new works to enlarge their capacity. They turn out 50 plows daily at present, which they will increase to 150 in their new works. The process of treating their iron is not divulged.

R. H. Arnold, of Honeoga, has invented an adjustable spindle attachment for broken axle-tree, by means of which a break otherwise serious can be repaired in a few minutes. It is said to be a simple, practical and useful device.

PENNSYLVANIA.

Logan, Eagle, Milesburg and Howard are all the furnaces now in blast in Center county.

The capacity of the Reading Bolt and Nut Works of J. H. Sternbergh is being increased by the introduction of some new machines, which will be used for the manufacture of cold-punched nuts and boiler and tank rivets, a new line of goods. Heretofore the articles manufactured at this place embraced only hot-pressed nuts, lag screws and machine bolts. He is also building the new machinery, some of which is nearly finished. At present 80 hands are employed, and after the completion of the new machinery more hands will be engaged. The buildings were enlarged a few years ago with a view to the introduction of the new machinery, and there is ample room for the increase in machinery without any enlargement now of the buildings. Goods manufactured at the Reading Bolt and Nut Works are shipped to all parts of the United States, Canada and South America.

The Pottstown Ledger says: The firm of Potts Bros., this borough, have received a large contract for the manufacture of iron for the new oil pipe line, to be put down from the oil regions to Williamsport, and for the tank cars to carry the oil from Williamsport, over the Philadelphia and Reading Railroad, to the seaboard. The order, we understand, comes from the Reading Iron Works, at Reading, and is to be executed immediately. Messrs. Potts Bros. will at once double their force of operatives, so as to run day and night, and the work will keep their mill running with a continuous hum for several months.

Blast was put on No. 5 stack of the Crane Iron Co. last week. Four stacks are now in operation.

The office of Kimberly, Carnes & Co., in Sharon, and that of the Etna Iron Co., in New Castle, have telephonic communication. The distance is 22 miles, and the telephone is pronounced a complete success.

The production of the furnace of the Millerston Iron Co., at Macungie, amounted to 250 tons week before last.

Washington Furnace is the only furnace in Clinton county, and is owned by the Associated Land Co. of North America, parties living in England. It has been a fine property, but it has gone to decay very much.

PITTSBURGH AND VICINITY.

The Pittsburgh Forge and Iron Co.'s bar mill, guide mill and puddle mill, Allegheny, are all on double turn.

A. M. Byers & Co.'s lap-weld tube works—an addition to their plant—is nearly completed.

The relining of the second stack of the Shoenberger Furnaces is rapidly approaching completion, when it will be blown in.

The Pittsburgh Car Works, impelled by a rush of orders, began to run full time on Monday last. The works have been running only half time for several months.

It is rumored that an Eastern firm are negotiating for the old Fort Pitt Mill, Reese, Graff & Woods, with a view of starting the same at once.

Messrs. C. Coleman & Son, of Allegheny, are making 2000 railroad wheelbarrows to fill an order from South America. Klein,

Logan & Co., Pittsburgh, have also got an order for 6000 picks and shovels. The goods will be shipped by way of Baltimore.

The Apollo Rolling Mill is making sheet iron for tin plate. The Monitor Tin Plate and Galvanizing Company, of New York, have the contract for doing their tinning, and they have been able to produce an article equal to the imported, and altogether free from blisters. The Apollo Mill is running double turn with 200 hands employed, and is selling readily all its products.

We are informed that the managers of the Edgar Thomson Steel Works, after a careful examination of several stoves, have decided to adopt the Siemens-Cowper-Cochrane patent for their new furnace.

We have received from Messrs. Kier Bros., "Salina" and "Summit Cut" brands of fire brick.

The following analysis of their fire-clay, made by the Geological Survey of Pennsylvania. Sample of fire-clay from Armstrong county, collected by W. G. Platt at Salina Station, Westmoreland side of Kiskiminetas River, from property of Kier Bros.:

Silica.....	57.92%	5	4.
Alumina.....	31.64%	3	2.
Iron oxide of iron.....	1.13%	1	1.
Titanic acid.....	0.05%	0.05	0.05
Lime.....	0.50%	0.50	0.50
Magnesia.....	0.02%	0.02	0.02
Alkalies.....	0.44%	0.44	0.44
Water, &c.....	13.40%	13.40	13.40
Total.....	100.01%	100.01	100.01

Analysis of clays as made by Mr. S. S. Hart

in the laboratory of the second geological survey of Pennsylvania :

Silica.....	55.30%	47.25%	40.72%	60.32%
Alumina.....	27.84%	34.25%	37.26%	24.97%
Iron oxide of iron.....	2.91%	1.83%	2.26%	1.20%
Lime.....	.58%	.58%	.58%	.58%
Magnesia.....	.75%	.00%	.00%	.00%
Alkalies.....	3.01%	.36%	.57%	.21%
Carbonic Acid.....	1.140	1.990	2.280	1.220
Water and organic matter.....	7.49%			

Trade Report.

Office of THE IRON AGE,
TUESDAY EVENING, Dec. 31, 1878.

The closing week of the year is comparatively uneventful in financial circles. If the resumption of specie payments by the Treasury in the redemption of the only obligations which it has thus far dishonored is to be attended with any of the disasters which those opposed to a gold basis have predicted, we are certainly approaching ruin very quietly. So far are we from "universal bankruptcy," that the business community find cause for congratulation in the situation and the outlook. The period of annual settlements has led to very few failures; and there is reason to believe that nothing of an exciting or disturbing nature is imminent. Instead of looking forward to the redemption of the demand notes of the United States in coin as a calamity to be dreaded, specie payment is already an accomplished fact, so far as the domestic and foreign banks and the business public are concerned. The local money market is unprecedentedly easy for the season, and closes at 4@5% to borrowers on call. The discount rate on prime mercantile paper is 4½@6%.

The gold market has practically ceased to exist, except in a strictly commercial sense. There is no recognized difference between gold, treasury notes and national bank notes. There has been some demand for gold loans to fill contracts for delivery before the end of the year, and coin has been easily obtainable at 1-64% per day.

Government bonds are strong and buoyant. Only the 67s are weak, on expectation of a call of \$15,000,000 for redemption, which is looked for on Thursday, January 2. We give below the closing quotations for governments.

The stock market is fairly strong, closing at the quotations given below.

The bank return shows an increase of \$873,675 in surplus reserve, which now stands at \$10,478,775, against \$7,994,950 at this time last year, and \$14,909,525 at the corresponding period in 1876. The loans show a decrease this week of \$149,700; the specie is decreased \$397,400; the legal tenders are increased \$1,167,100; the deposits are decreased \$415,900 and the circulation is down \$500,300.

The following is an analysis of the bank totals of this week compared with that of last week:

Dec. 21.			Dec. 28.			Comparisons		
Loans.....	\$295,074,100	\$235,824,400	Dec.	\$149,700				
Specie.....	20,911,500	20,514,100	Dec.	397,400				
Legal tend'r's	39,600,000	40,767,100	Inc.	1,167,100				
Tot. reserve.....	60,517,500	61,381,200	Inc.	769,700				
Deposits.....	203,023,600	203,305,700	Dec.	415,900				
Required.....	50,906,400	50,802,425	Dec.	103,975				
Surplus.....	9,605,100	10,478,775	Dec.	803,075				
Circulation.....	20,977,000	20,576,700	Dec.	500,300				

The following are the statistics of foreign trade for the week so far as obtainable at the hour of going to press:

IMPORTS.
For week ended Dec. 28:

	1876.	1877.	1878.
Total for week.	\$4,035,578	\$4,451,733	\$5,504,356
Prev. reported.	\$74,490,079	311,744,977	351,315,788

Since Jan. 1....\$278,531,651 \$312,196,630 \$368,880,744

Included in the imports of general merchandise were articles valued as follows:

Quantity.	Value.
5,936	\$50,572
Brass goods.....	1,727
Bismuth.....	21
Bronzes.....	672
Chains and anchors.....	1,088
Copper.....	49,923
Cutlery.....	105,355
Gas fixtures.....	4,032
Guns.....	1,304,160
Hardware.....	28
Hides, skins, &c., tons.....	8,734
Iron, sheet & tons.....	634
Iron ties.....	28,018
Iron tubes.....	782
Iron ore, tons.....	11,877
Iron other tons.....	37,254
Lead, pigs.....	7,385
Metal goods.....	6,338
Nails.....	1,152
Plates, &c., tons.....	8,734
Iron sheet & tons.....	634
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In view of the fact that the Lehigh Valley operators steadily refused to continue the combination upon the last year's basis, or form a new one unless a larger tonnage was given to them or a new basis agreed upon, the ending of the combination had practically been discounted, and the recent auction sale of 100,000 tons showed very nearly the temper of the buyers. Dealers generally throughout New York city and in many portions of the country have closed the year with as light stocks as they could safely have and carry on their business. The quantity of domestic Coal laid in has apparently been somewhat light. The consequence of this is that the cold weather has, in spite of the ending of the combination, brought a very fair business, especially in all the domestic sizes. These sizes are in fact scarce, and we hear that some of the smaller operators have sold themselves short on the month's delivery. The prices are in general from 10¢ to 25¢ per ton in advance of the auction sale, but in most cases the printed quotations are shaded from 5¢ to 15¢, according to circumstances. Steam Coals are not in active demand, and prices are not as stiff. The cold weather, high winds in the harbor, and the rapid closing of the Hudson, all have had a tendency to stiffen prices for the moment. The Coal men in the city, although very anxious about a future combination, have apparently very little to complain of in the way of trade for the next 30 days, especially if the cold weather lasts. So long as the market retains its present features there is little probability that a combination will be formed, for it appears that each company will have about all it can do to attend to filling its own orders. Outside of the Lehigh dealers it is very curious to see how firmly convinced Coal merchants are of the absolute necessity the Lehigh people have for a combination, and how much more benefit will accrue to them from joining a new combination than going on without one. The trade talk as though it was a settled fact that the Lehigh people are already very sick of the fight for tonnage and were ready to get back to the fold of a combination. We do not, upon the closest inquiry, find any trace of this feeling, however. The fact of the case seems to be that the Lehigh people are very ready to go on and take the market as they find it, believing that there is a regular demand for a certain amount of their Coal, no matter what quantity of the other Coals is mined. The actual question of a combination, however, is not at all likely to come up for the present.

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Dec. 29, 1878:

Hardware.

Boker Hermann & Co.

Cutlery, cs. 12

Per caps, 12

Blumhardt A. & S.

Casino, 1

Fales Thos. S.

Guns, cs. 1

Folsom H. & D.

Guns, cs. 4

Hildick A. H.

Anvils, 70

Horn R. & Co.

Cases, 2

Hodgkins & Haigh,

Guns, cs. 1

McCoy & Co.

Couch, 1

Hornick, 7

Moore's John P. Sons,

Guns, cs. 3

Mdse. pkgs, 6

Mason John W. & Co.

Wire rope, coils, 15

Planque de E.

Cases, 2

Pim, Forward & Co.

Casino, 10

Rodgers Cutlery Co.

Cases, 1

Ranf Richard,

Ironware, cs. 9

Strasburger Pfeiffer Co.

Cases, 2

Schuyler, Hartley & Graham,

Guns, cs. 2

Schoeveling & Daly,

Mdse. pkgs, 2

Iron.

Hussey, Howe & Co.

Swedish bars, 6639

Marvel W. D. & Co.

Ore, tons, 440

Moore's John P. Sons,

Bars, bds., 120

Phelps, Dodge & Co.

Sheet, bds., 43

Order,

Sheet, bds., 17

Spiegel, tons, 332

Pig, tons, 100

Steel.

Merrick C. S.

Cases, 4

Bars, 12

Bundles, 77

Prosser Thos. & Son,

Tire forgings, 5

Bars, 4

Bundles, 50

Saxton & Seabury,

Cases, 8

Sandercock & Co.

Bundles, 17

Woodford W. O.

Bundles, 294

Bars, 1

Order,

Bundles, 38

Bars, 11

Casks, 27

Cases, 14

Metals.

Brace & Cook,

Black plates, 50

Cort N. L. & Co.

Tin plates, bxs., 1127

Hooley & Co.

Scrap metal, bales, 2

Meyer Moritz,

Lead bars, 6336

Naylor & Co.

Tin plates, bxs., 1827

Phelps, Dodge & Co.

Tin plates, bxs., 2107

Scheider Jos. & Co.

Tin plates, bxs., 316

Wessels G.

Scrap metals, lbs.,

3178

Scrap cop., lbs., 1337

metals, cks., 4

Copper pumps, 4

Tin plates, 1569

Tinne plates, 1335

Tin, slabs, 622

OLD METALS, PAPER STOCK, &c.

The market for Old Metals, Paper Stock, Rags and other junk materials has continued without any especial feature of interest during the past week. Business is very quiet and prices remain nominally unchanged.

The purchasing prices offered by dealers or Old Metals are as follows:

Copper, heavy, per lb. \$0.1

Copper Bottoms, 10.5%

Yellow Metal, 10.5%

Brass, heavy, 10.5%

Composition, 11.5%

Lead, solid, 0.5%

Tin Lead, 0.5%

Zinc, 0.5%

Pewter, No. 1, 10

Pewter, No. 2, 0.8

Wrought Iron, prton. \$16.00

Light do., 9.00

Stove Plate, 9.00

Machinery do., 11.00

Grate Bars, 3.50

The prices current for Rags, &c., are as follows:

Canvas, Linen, per lb. 3 c. @ 34c.

Cotton, No. 1, 34c. @ 3c.

No. 2, 34c. @ 3c.

White, No. 1, 34c. @ 3c.

No. 2, 34c. @ 3c.

Seconds, 34c. @ 3c.

Mixed, Woolen, 64c. @ 3c.

St. Louis, 34c. @ 3c.

Gumy bagging, 34c. @ 3c.

Guny bags, 34c. @ 3c.

Kentucky bagging, 34c. @ 3c.

Book Stock	14c. @ 14c.
Newspaper Stock	14c. @ 14c.
Waste Paper and Scraps	14c. @ 14c.
Kentucky Bale rope	1 c. @ 14c.
Farred Shaking	1 c. @ 14c.
Grass Rope	6c. @ 14c.

PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, Pittsburgh, Pa., Dec. 30, 1878.

General business has been exceedingly dull the past week, as was to be expected, and is always during the holiday season; and, moreover, there is not likely to be much if any improvement for a couple of weeks to come, as many of our business men will be engaged during the time in question in taking stock and making annual settlements. The year just closed has been an eventful one in a business point of view, and one that will long be remembered by our merchants and manufacturers; many were forced to succumb who a year ago thought, to use a common expression, themselves "solid," while others who went into '78 with great apprehension, surrounded as they were by difficulties that appeared insurmountable, have, by hard work and great care, succeeded in getting through; and these, as might be expected, feel a good deal better now than they did one year ago. The year has also been characterized by great rascality in business circles, more so, possibly, than any preceding year in the history of the country. As soon as it became known that the bankrupt law would be repealed, a great many men whose chief object in life appears to be to get rid of paying their debts, commenced to lay their plans, and many of them before the 1st of September, when the repeal took effect, had succeeded in getting everything they had in the shape of property out of their hands. There is no question but many men went to work deliberately and systematically to take advantage of the bankrupt law, and in the manner described, by turning everything they had over to their relatives and friends, leaving nothing for their creditors, to whom, if honestly disposed, they could have paid every dollar they owed; and many people have been seriously crippled if not ruined by this kind of work. Those, however, who have succeeded in weathering the storm, who have honestly met their obligations, did not take advantage of the bankrupt law, and, by their strict sense of honor and uprightness came out of the conflict of the past five years with clean hands, need have no apprehension of the future, as the fury of the storm has certainly been spent. But those who have been crooked in their dealings and managed to get through by dishonesty have but little to hope for, as they have been spotted and will not be permitted to repeat their offense where they are known. The fact of the matter is there are a good many "behind the bars" for offenses that deraud creditors by taking advantage of the bankrupt law.

As the close of the old year is at hand there is considerable anxiety in regard to the course of the Iron trade for the year 1879, and in this, as might be expected, there is a diversity of views. It is generally admitted that the volume of business in 1878 exceeded that of any former year since the panic, but, owing to the ruinous prices that prevailed most of the year, there was very little money made. Some few firms making specialties will close the year with a balance on the right side of the profit and loss account, but many will come out behind, while others will feel well satisfied if they come out even or have as much money as they had at the commencement of 1878. The market generally sustained fewer losses by bad debts as compared with 1877, having exercised greater care, and it is worthy of mention in this connection that the market has ruled decidedly firmer during the past three or four months, manufacturers here in Pittsburgh, having determined that they will no longer sell at a loss. In some important respects the outlook is favorable for the incoming year, both as regards the raw article and the products, but the trade generally do not anticipate any very decided advance soon; on the contrary, they expect that it will be slow and gradual. It is expected that the consumption in 1879 will exceed that of 1878, with but little increase in the production, and as the cost of production is more likely to be increased than decreased, and current rates afford, under the most favorable circumstances, little or no margin for profit, it is reasonable, we think, to expect a higher range of prices. Navigation to all points is suspended, and this is not without its effect in depressing general business, which at best is always light during the last month of the year. According to the old saying, however, "It is an ill wind that blows nobody good," hence, while the suspension of navigation may curtail other branches of business, it will benefit the coal business by shutting off supplies to the down-river markets, increasing the consumption, and if it holds out long enough will enable holders to obtain better prices.

Pig Iron.—The situation remains much the same as noted in our last report. Business continues very dull. The demand is confined to supplying immediate actual wants, and the probability is that this course would be closely adhered to for some weeks to come. In regard to prices there has been no change whatever for some considerable time past one way or the other. Stocks are light, both in first and second hands, as compared with a year ago, as is also the production, and the probability is that but few of the furnaces that have been idle will be started up soon, in the absence of any inducement to do so, as there is no money in the business at current rates under the most favorable circumstances. An advance in prices is confidently anticipated with the revival, and the volume of orders and the number of inquiries quite justify the expectation. We quote: Coke Irons, No. 1 Foundry, \$17.50 @ \$18; No. 2, \$15.50 @ \$16; Gray Forge, \$13.50 @ \$14; White and Motled, \$11.50 @ \$12. Hot-Blast Charcoal—No

were stopped and robbed by the famishing people. This may be, and I think is, somewhat exaggerated, yet the fact remains, and is incontrovertible, that at the present moment thousands of the people of Great Britain are absolutely starving. In all directions there is presented the picture of idle blast furnaces, rusting machinery, silent mills, smokeless factory chimneys, and shivering, starving men, women and children. There is no exaggeration in this statement—any one can, unfortunately, more than verify it by a merely cursory journey through the districts I have indicated. Wealth is certainly doing something to relieve its brother poverty, but of the pounds, shillings and pence thus far subscribed it may be said with truth, "But what are they amongst so many?" At Sheffield about £6000 has been subscribed toward the local fund, and there are daily distributions of soup, clothing, &c.; yet what has been done necessarily falls far short of what is wanted. There is, too, little or no hope of any early change for the better. The most sanguine person cannot reasonably predict such an alteration during 1878, and no stretch of imagination is needed to see that nothing but a wholly unexpected change can do us good prior to the setting in of the spring season.

HAVE WE REACHED THE BOTTOM? is one of the queries most frequently propounded in commercial circles, or are there even lower depths to which we must descend? The question is much more easily asked than answered. In the opinion of some persons the end is nigh and the goal of renewed prosperity in sight. They instance quite a host of precedents to show how regularly these trade depressions come about, and the corresponding regularity with which they are removed. They tell us that the present is on a par with all its predecessors, and that by the operations of the ordinary rules and laws, a change for the better will inevitably come about before long. They have certainly a good deal of argumentative evidence on their side, but those who take the opposite view insist that the cases are not parallel, and that never before have the causes of bad trade in Great Britain been similar to those of the last year or two. These gentlemen tell us—and with some plausibility too—that in all the former instances England stood at the top of the tree and really supplied the whole civilized world with almost all kinds of manufactured goods. Nowadays this is not so—indeed, the reverse is rather the case. England no longer has a monopoly, but is hard pressed on every side by competitors—some able and energetic, others merely passive blockaders—who not only have ceased to consume our products, but are clamoring and fighting us in all the markets which still remain neutral. These, say the pessimists, are in reality the causes of our tentative decline and fall. Starting from these premises, reciprocity, or the taxation of certain of our imports, is advanced as the remedy, and is supported by arguments of which I have given you examples in former letters. Which of the two theories is the true one you can judge as well as we can here, but so far as I am enabled to judge I feel bound to say that I think the "weight of evidence" is with those who look upon the development of foreign manufactures as the leading cause of the depression.

AMERICAN COMPETITION, at all events, is not merely supposed to be, but is very formidable. Whether it pays your manufacturers or the contrary is altogether beside the question presented for our consideration; it is sufficient for us to know that the goods are in our and other markets, and that our own business diminishes almost precisely to the same extent as yours is developed. A good and strong example was furnished here last week at the

SMITHFIELD SHOW,

held, as usual, in the Agricultural Hall, Islington. There was a large exhibition of machinery and implements—so large, indeed, that you will, perhaps, notice that very brief notices of the various stands filled 27 pages of the *Ironmonger* of December 7 and 14—by all the best known British makers. Among these the products of American foundries and workshops occupied prominent places, and not a few of them attracted very great attention. There is no "gas" in this statement, for the stands of Walter A. Wood, the McCormick binder, J. G. Rollins, the Johnston harvester, the Buckeye reaper and many others were thronged with visitors—some of the purely bucolic type, others keen-eyed men of business, with both eyes very wide open for the observation of the latest perpetrations of the restless Americans. Your pumps and weighing-machines, as respectively represented by Douglas, Howe, and Fairbanks; your reapers and mowers, your drills—notably the Farmer's Friend—your rakes, especially the Hollingsworth, and your thousand and one "notions" were dexterously displayed, and, I should presume, obtained almost unlimited publicity. The British manufacturers, of course, term some of your productions "cheap and nasty," but of this, I take it, time is the best test. It is, to my knowledge, quite surprising how your exporters can send certain goods here at lower prices than our own, particularly under the conditions now prevalent here as regards materials, labor and fuel, all of which are down to the apparent minimum of cheapness.

IN SCOTLAND

the market rules slow, and owing to the rapid approach of the end of the year, is pretty certain to remain sluggish. There are, nevertheless, 92 furnaces in blast, as against 88 at this time last year. Stocks in Connal's stores are 199,353 tons, as compared with 167,245 a year ago. The shipments to date total 50,591 tons below those for 1877 to date.

Writing from Glasgow on December 24, James Watson & Co. said: "We have to report a quiet market for Scotch pig iron. On Monday business was done in warrants from 43/ to 42/8 cash. Tuesday's market was flat at 42/7½ to 42/8½. Wednesday was lifeless at from 42/7 to 42/8½. On Thursday market was stronger, price touching 43/0½, but closing weaker at 42/10½. To-day business has been done from 42/9½ to 41/11, closing buyers at latter figure and

sellers at 43/ cash. Shipments last week were 8320 tons, as compared with 5221 tons for the corresponding week of 1877. Makers' brands are unaltered."

A DESPERATE FIGHT

with the Cleveland pig iron producers is now going on in Scotland, owing to the strenuous efforts of the Scotch makers to regain the home business, which they had lost to the North of England invaders. So long as the foreign branches remained in even a moderately brisk condition, Scottish manufacturers were content to overlook their own foundries and forges, but now, as an extreme resource, they have looked around them, and have formed a compact to oust the trespassers. So far the battle royal, which is raging furiously all along the line, seems to favor the Scots, but the Middlesboro' Chamber of Commerce authorities inform us that the success is being achieved at "very great cost to themselves" (the Scotch makers). No doubt the founders, &c., in Scotland are quite content to let the fight go on.

THE MIDDLESBORO' OFFICIAL REPORT

for November says, *inter alia*: "Business in pig iron has been in a very poor condition. As regards manufactured iron and steel, the mills have not been so well employed; some of the plate mills have been stopped for a few days on account of the non-receipt of specifications. The demand having further declined, quotations have been reduced also, but have not brought about any increase of orders. Ship plates have been obtainable at £5. 17/6; boiler plates, £6. 17/6; common bars, £5. 5/; sheets, £7. 12/6; angles, £5. 5/; all less 2½ per cent. at works. This is about the worst time of the year for the finished iron trade. Very little foreign business has been in hand, the bulk of the work turned out being for home consumers. General iron founders have been very badly off, but pipe founders have been keeping their establishments going regularly, though their prices have been rather easier, in sympathy with the drop in pig iron. Chair founders have received a few new orders for the home railways. Messrs. Gilkes, Wilson, Pease & Co. have obtained one for 5000 tons on behalf of the London and Northwestern Railway, and the Anderton Foundry one for the Great Eastern. Mr. Charles Wood's new patent wrought-iron

is laid down on a portion of the line between Middlesborough and South Bank, where the traffic is heaviest. The sleepers are being rolled by Messrs. Hopkins, Gilkes & Co., Limited. The engineering industry has been very slack, but tubes have been turned out in fair quantities, and the works have been as well off as at any time during the year. The wire mills have not had so much trade, and at the cut-nail works operations have been rather quiet. Bolts and nuts have been in moderate request, and galvanizers have only had a small amount of business.

AT SHEFFIELD

there has been no material change during the past week, except as regards the skate branches, which have received a great and welcome spurt, owing to the severity of the frost. There had been an immense accumulation of these articles for several years, but this "blast" has tended to reduce stocks very considerably. Formerly there was little or no competition in skates, but at the present time German ones are said to be obtainable, delivered in Sheffield itself, at 5d. per pair, minus the straps. As an example of the rapid clearance made during a keen frost it is mentioned that in 1870 one Sheffield house sent off 12,000 pairs in five days. Last week as soon as the ice began to bear every hour brought in letters and telegrams with orders from all parts of the country. To-day, however, a partial thaw—accompanied with the blackest and most impenetrable fog I ever saw—has set in! Sic transit, &c.

STAFFORDSHIRE

yields no news of more than passing interest, saying that the Chatterley Iron Company is to be wound up voluntarily. In no kind of iron is there anything more than a hand-to-mouth business being done, despite the exceedingly accommodating course of prices. In the miscellaneous industries of the Black country there is only a moderate amount of work in hand, several of the trades being largely affected by German, Belgian and French competition. This is the case with tubes, wire, nails, locks and common hollow-ware.

FROM BIRMINGHAM

our current intelligence is rather scanty, but one particular item detailed by the clever correspondent of the *Ironmonger* may, I dare say, prove of interest to you. He states that several Birmingham houses are producing hoes, hatchets, axes, &c., on best American patterns, "equal to and sometimes superior in quality," and in most cases 10% to 20% cheaper. The "Collins" ax of Messrs. Yates is, he adds, fast outstripping the original American article from Brazil, Peru, Cuba and Venezuela, and is also making headway in Australia and New Zealand. This particular firm's trade with Rio alone has increased tenfold within the last three years, and is rapidly growing with the River Plate, &c. In the Cape market your makers are also stated to have been thoroughly beaten. Is that so?

FROM SOUTH WALES AND MONMOUTHSHIRE the latest news is that a petition has been filed asking for the winding-up of the Blaenavon Company, on whose works £60,000 has recently been expended in extending the rail, &c., mills. It does not, of course, follow that the terms of the petition will be complied with. The tin-plate manufacturers remain fully engaged, and are asking 1/ @ 1/6 per box more money. Cokes sell best. At the new Rhymney steel works, 1247 tons of steel were made last week. Sundry recent contracts for rails are stated to have gone to the North and West, and but few to South Wales.

THE METAL MARKETS

have been quiet, albeit tin has shown renewed steadiness. The *Ironmonger* reports: "Copper continues dull, good ordinary brands Chili bars being quoted at £58, spot. No transactions have been reported in Australians. On Wednesday 267 tons of Cape ores were sold by tender at about 11/7 per unit for

31 1/4% produce. Wallaroo has sold at from £68. 10/ @ £68. 15/; Burra, £66; English tough, from £63. 10/ @ £64; best selected, from £64. 10/ @ £65. 10/; and strong sheets at £69. Tin, firmer, business having been done at £61/ @ £61/10 for fine foreign, spot, and £60. 10/ @ £61/ forward. English ingots quoted at £66. The public sale at Batavia on Monday of about 10,000 piculs Billiton, realized an average of 41.67 francs per picul. **Tin Plates.**—The market is steady, and the firmness in price seems to be on the increase. For the United States the demand not only continues strong, but is also apparently increasing. **Lead** continues dull, English pig selling at from £14. 15/ @ £15/; and soft Spanish without silver at £14. 15/.

Zinc.—Zinc is without any material alteration in price, Messrs. Sargent & Son, at their public sale on Thursday, disposing of 10 tons at £20, and 8 tons at £20. 2/6. **Spelter.**—Spelter is selling at from £16. 10/ @ £16. 15/ for ordinary brands; **Quicksilver** at £6. 10/; and **Antimony** at £48. The Official Report of the London Metal Exchange was: **Copper**—Easier; small transactions in Chili Bars, £57. 5/ @ £57. 10/; Wallaroo, quoted, £68; Burra, £65. 10/ @ £65. 15/; English tough, £63 @ £64; best selected, £64 @ £65; strong sheets, 69. **Tin**, steady, with business in fine foreign at £61 spot and arrival; English ingots, 66. **Iron.**—Scotch pigs, 42 1/2, cash. **Lead**.—Dull English pig, £14. 15/ @ £14. 17/; soft Spanish, without silver, £14. 15/.

Spelter.—Firm, £16. 10/ @ £16. 15/ for ordinary brands. **Zinc.**—No sale. **Quicksilver**.—£6. 10/.

Antimony.—The consumption has been light, and Saxonian Cubes have been offering at 9 marks down to 7.50 per kilo.

General Review of the Metal Market, 1878.

When the year opened it was hoped, and even expected, that the course of prices would be more favorable to the producer. It was believed that some of the metals had declined sufficiently to compel a curtailment of production, and there seemed to be some probability that speculation, dormant for years past, would be induced to take charge of stocks at the ports of some metals depressed below their intrinsic value. At all events, it was not apprehended that 1878, in point of depreciation, would be but the counterpart of its predecessor. Yet unexpected as it was, this has been the case, and all metals are now lower than what they were 12 months since, and the question arises whether in 1879 it will be probable that some of the lost ground may be recovered, not in all, at least in some, of the leading metals.

The greatest obstacle in the way of a healthy reaction in 1878 has been not so much, we believe, continued large production as the persistency with which the industrial crisis clings to the principal countries of Europe. It had been hoped that at length England, Germany, Austria and France, as well as Belgium, would launch out again on the flood of a solid revival, assisted by abundance of capital, increasing consumption and the settlement of the Eastern question. Unfortunately Europe does not possess the elasticity of America, nor the manifold resources we can boast of. The enormous losses entailed all over Western Europe by the depreciation of Turkish and other doubtful securities, the fall in the value of real estate, the inevitable decline in the wages of the laboring classes which has made some progress, and the bad cereal crops, have all combined to retard the advent of more prosperous times. The failures in England during the last quarter of the year have shown that even there, where the multiplicity of resources should have re-established prosperity the soonest, solid recovery is apparently about as remote as it was some years ago. Such being the case, there is some consolation in the fact that, compared with Europe, we are now in an infinitely better position—much better, indeed, than at any time since the Franco-German war. Best Selected simultaneously fell to £68. 10/.

The shipments from Chili to Europe from January 1 to May 16 had been 24,111 tons, against 22,462 in 1877, 23,229 in 1876 and 21,400 in 1875. Those familiar with the cost of production of Copper in Chili, however, promptly came to the conclusion that there was nothing to warrant such low prices, and their vigorous action caused a rebound to £65, which was still £4 lower than Chili Bars stood twelve months previously. Subsequently they again yielded to £63. 10/ in the London market, at which figure the month of June closed on the other side, while here we remained moderately active, the sales in June running up 575,000 pounds at 16 1/4 @ 16 3/4, the market closing at 16 1/4 @ 16 3/4.

At the sale of Australian Copper at London in June, 594 tons Wallaroo sold at £73. 4/ and 285 tons Burra Burra at £70. 16/.

The usual dull spell of midsummer now being upon us, and manufacturers attending to their semi-annual repairs, business became limited in volume during July, sales not exceeding 450,000 pounds at 16 @ 16 1/4, the month closing at 16 @ 16 1/4.

In August, Best Selected simultaneously fell to £66. 10/.

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tinued failures in England and some important ones at Hamburg and in Saxony, at first exercised a depressing influence on both sides of the Atlantic, but it soon became evident that there was no financial crisis to be apprehended in England, the bank discount at London having appreciated one per cent. and no more. Copper was thus permitted to recover in the London market, the more so as it was discovered that manufacturers were holding comparatively moderate stocks, and that the shipments from Australia would remain limited for the time being. Chili Bars consequently rose to £60. 10/- in November. The sales in this market in November were limited to 1,000,000 pounds at 15 1/4@ 16 1/4, closing at 15 1/4. In December the market was moderately active, sales running up 1,000,000 pounds at 15 1/4@ 16 1/4, closing at the latter figure. London settled down to £64 with Best Selected and to £57. 10/- with Chili Bars. The shipments from Portage and Torch Lakes, through the Portage River Improvement Canal, during the season of navigation 1878, have been 8,305,368 pounds refined and 9,347,733 mineral Copper.

Value of Ingot Copper at New York in currency.

	1873.	1874.	1875.	1876.	1877.	1878.
January.	35	36	23 1/2	31	19 1/2	17 1/2
February.	34 1/2	35	22	23 1/2	17 1/2	17 1/2
March.	34	24 1/2	21 1/2	22 1/2	19 1/2	17 1/2
April.	34	25	22 1/2	22 1/2	18 1/2	17 1/2
May.	32 1/2	24	23	20	19 1/2	16 1/2
June.	20 1/2	24 1/2	23	20	19 1/2	16 1/2
July.	27	21	23 1/2	19 1/2	18	16 1/2
September.	27	21	23 1/2	20 1/2	18	16 1/2
October.	24 1/2	22 1/2	23 1/2	21	17 1/2	16
November.	24 1/2	23 1/2	23 1/2	20 1/2	17 1/2	15 1/2
December.	24 1/2	23 1/2	23 1/2	20	17 1/2	15 1/2

European Statistics.

	Price of Chili Bars.	Visible supply in England & France.	Tons.
1877-Dec. 1.	63 10	0	36,861
1878-Jan. 1.	66	0	38,713
Feb. 1.	66	0	37,769
March 1.	65	0	40,335
April 1.	60	0	41,460
May 1.	69	0	40,725
June 1.	64	0	40,990
July 1.	64	0	41,782
Aug. 1.	64	0	43,325
Sept. 1.	65	0	44,985
Oct. 1.	66	0	44,757
" Nov. 1.	57	0	47,567
" Dec. 1.	59	0	47,073
1874-Dec. 1.	57	0	26,668
1875-Dec. 1.	81	0	29,222
1876-Dec. 1.	76	0	31,623
1877-Dec. 1.	63 10	0	36,861
1878-Dec. 1.	59	0	47,073

Tin.

During nine months of the year the course of Tin has been nearly uninterrupted downward, for a number of reasons. In the first place everybody engaged in the metal trade had for years past been losing money on it, and confidence in it had been lost. Speculators for a rise had long been disgusted with it, and what little faith there had remained in its eventual recovery disappeared when we were told of the new sources of supply at a comparatively low cost from Tasmania, where the Mount Bischoff and other mines were adding to the already considerable shipments from the mainland of Australia. Although the circumstance that Tin was as cheap as Copper evidently was well calculated to stimulate its consumption for many purposes, production continued to exceed the enlarged demand, and European statistics, despite the satisfactory deliveries, still remained unfavorable. In the United States, it is true, consumption had increased considerably, proportionately more so than in Europe, but at best this could hardly form a sufficient offset against the excess of production in Australia. Where a really promising field for a largely increased consumption might open, it was admitted, would be China at about its current value, and anticipations in this respect have been fully realized. At all events the experience of the year has shown that Tin is still capable of an extraordinary temporary rebound in spite of the many adverse circumstances it has to contend with, and that it is well worth watching. The year opened here with Straits Tin at 15 1/4, and in London at £65. The supply here being ample and the demand slack, a decidedly downward tendency soon developed, carrying down the price to 14 1/4@ 14 1/4, toward the close of the month, while London gradually gave way to £63. 10/-, and Singapore dropped from \$18.75 per picul to \$18.50. Accounts came to hand from Banks showing that the supply for the year had been 65,000 piculs. The Banks sale in Holland had come off at equal to £62. In February our market, under heavy arrivals, gave way still further, the more so as fumtures (lots afloat) were constantly offering 1/4@ 1/4 below spot prices, the month closing at 14 1/4@ 1/4, while London remained steady, and Singapore declined to \$18. Although early in March there were still afloat for this country from the Straits some 20,000 slabs, rather a better feeling obtained as the month advanced, there being signs of an improved spring demand, and the better tendency being fostered moreover by more favorable cable advices from England, Holland and Singapore. London recovered to £64. 10/-, Singapore to \$18.75 and the Dutch sale averaged 41 guilders. Toward the close a slight reaction occurred here and abroad, but our market nevertheless wound up at 14 1/4@ 14 1/4. News reached us from the Straits settlements that the production there in 1877 had been 250,000 piculs, against 220,000 in 1876 and 210,000 in 1875. The April visible supply in England and Holland was 17,193 tons, against 17,260 in 1877, and the London price for Straits £63. 10/-, against £60. 10/- the previous year. The month proved a dull and weak one, both here and at London, prices being carried down to 14 1/4@ here, and to £62 there, while Singapore continued to fluctuate between \$18.25 and \$18.50. In May the uncertain aspect of politics in Europe continued to weigh heavily on the markets, restricting new undertakings, and caused Tin to recede temporarily to £60. 10/-, while the Dutch sale came off nearly a couple of guilders lower at 39.37 1/4, but finally there was a recovery to £62. Singapore had remained unaltered throughout at \$18.25. The market here kept tolerably steady, with a moderate business, and closed at 14 1/4@. In June news reached us from Tasmania of new Tin discoveries at Mount Haemakirk, on the West Coast, and coupled with large amounts of Tin known to be afloat this way from the Straits, some

15,000 slabs, caused great dullness, the price declining to 14 1/4@. There were continual fluctuations at London, Straits declining from £63 to £61, and recovering to £62, while Singapore held steady between \$18.25 and \$18.37 1/4. The visible supply in England and Holland on July 1 was 17,914 tons, against 17,904 in 1877, the London stock being 9500. Accounts came to hand from Netherland India that Billiton production in 1877 had been 61,794 piculs, against 59,533 in 1876. In July extreme dullness caused holders of Tin to press sales in this market, especially distant lots afloat, which were offered at 13 1/4@, spot Tin dropping to 13 1/4@. Both London and Singapore remained unaltered, the former at £61 and the latter at £18.25. On Aug. 1 the London stock had increased to 10,100 tons, the entire visible supply at the time being 18,490 tons, against 18,250 in 1877. Trade in Tin remained lifeless at New York throughout the month, spot Straits declining to 13 1/4@ and afloat to 13 1/4@. London dropped to £60 and Singapore to \$17.50. On Sept. 1 the London stock had reached 10,120 tons, and the market there became very much demoralized, Straits at one time dropping to £55. 15/-, while Singapore, on the contrary, kept steady at £17.75. The September Dutch sale came off at 37 guilders. Straits here early in the month sold at 13 1/4@ @ 13 1/4@, and was offered at 13@ to arrive without buyers. Soon, however, a favorable reaction set in on the strength of an improving statistical situation on this side, the discovery being made that at ruling low prices consumption had absorbed rather larger amounts than had been anticipated, the quantity afloat at the same time becoming quite moderate. Our market recovered to 13 1/4@ @ 13 1/4@. The month of October was ushered in at London under exceptionally unpropitious circumstances in consequence of the Glasgow and other important failures, and in panic Straits was forced off at £53, Singapore simultaneously declining to \$17.50. But this demoralized condition of the Tin market lasted but for a day and was immediately followed by a vigorous rebound, a syndicate of operators having taken charge of the metal in the London market. Coinciding as this recovery did with the improvement previously inaugurated at New York, there was no serious obstacle to a prolonged upward movement. Even the continued failures in England proved no impediment, inasmuch as they did not assume the character of an approaching financial crisis. Prices here rapidly rose to 15 1/4@, London recovered to £60 and Singapore to \$18, the excitement being equally great in all the leading Tin markets. In November news reached us that the shipments from Australia to England had latterly been abating materially, and that the accounts from Tasmania had been very much exaggerated so far as an immediately increased supply from there was concerned. Holders and speculators for a rise had no difficulty in pushing prices a little further in November, the price here gradually advancing to 16 1/4@ @ 16 1/4@; in London to £65, and at Singapore to \$20, the closing figures of the month. Outside of the principal Tin markets this extraordinary rebound in the metal had, however, been received with distrust and hesitation from the very commencement, particularly so in France and Germany, the great Tin consuming countries on the Continent, and in those localities the cold shoulder was given to a movement which they looked upon as mainly speculative, and therefore evanescent, unless based either on a really increased consumption or an undoubted curtailment of production. Add to this the persistency with which failures continued both in England and Germany, and the undeniable distress in industrial circles all over Europe, and it became pretty clearly perceptible that the metal would soon again be abandoned by its chief supporters. December consequently found Tin ready once more for its habitual recoil and a rapid downward course of prices was inaugurated at once on both sides of the Atlantic, values receding as the month advanced till about the middle of it, when, after declining to £60, Straits recovered to £62. 10/-, while we steadied here at 15 1/4@ @ 15 1/4@. During the latter half of December business became flat, while stocks began to accumulate. London wound up the year at £61, Singapore at \$18.75 and we at 14 1/4@ @ 14 1/4@.

Lowest and Highest Price of Straits Tin at New York:

	1877.	1878.
January.	15 1/4@	17 1/4@
February.	15 1/4@	17 1/4@
March.	15 1/4@	17 1/4@
April.	15 1/4@	16 1/4@
May.	15 1/4@	17 1/4@
June.	10 1/4@	14 1/4@
July.	15 1/4@	16 1/4@
August.	15 1/4@	16 1/4@
September.	15 1/4@	16 1/4@
October.	15 1/4@	16 1/4@
November.	15 1/4@	15 1/4@
December.	15 1/4@	16 1/4@

Price of Banks Tin in Holland in Guilders the 50 Kilos:

	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
Jan.	1.65	77	87 1/2	85 1/2	70	57 1/2	50	45	40
Feb.	1.64	78	86	87 1/2	70	58 1/2	50	45	40
Mar.	1.70	73	85	84	68	54	50	45	40
April	1.75	70	93	87	53	51 1/2	48	40	39 1/2
May	1.78	70	94	87	53	50 1/2	48	40	39 1/2
June	1.78	70	95	88	50	48 1/2	42	36	35
July	1.78	70	94	86	50	48 1/2	42	36	35
Aug.	1.69	70	94	86	50	48 1/2	42	36	35
Sept.	1.75	80	93	86	51	48 1/2	42	36	35
Oct.	1.74	80	94	74	52	48 1/2	42	36	35
Nov.	1.73	84	92	75	52	48 1/2	42	36	35
Dec.	1.73	88	87	75	52	48 1/2	42	37 1/2	39

Tin Plates.

Tin Plates have been remarkably steady in this market during the year just come to a close; they have declined it is true, but this decline has been very gradual and has amounted to not quite 10%, spread over a whole twelvemonth. Consumption has developed satisfactorily in the United States, and the Welsh makers would have no cause for complaint if other countries had proved as steady customers as we have been. The following table will show the course of Tin Plate values since the panic.

Average Value of Ordinary Brands per Box at New York at Different Dates:

	1874.	February 1, 1875.	March 1, 1875.	April 1, 1875.	May 1, 1875.	September 1, 1875.	October 1, 1875.	December 1, 1875.	January 1, 1876.
January 1, 1874.	\$8.75	February 1, 1875.	March 1, 1875.	April 1, 1875.	May 1, 1875.	September 1, 1875.	October 1, 1875.	December 1, 1875.	January 1, 1876.
February 1, 1874.	8.50	8.50	8.50</						

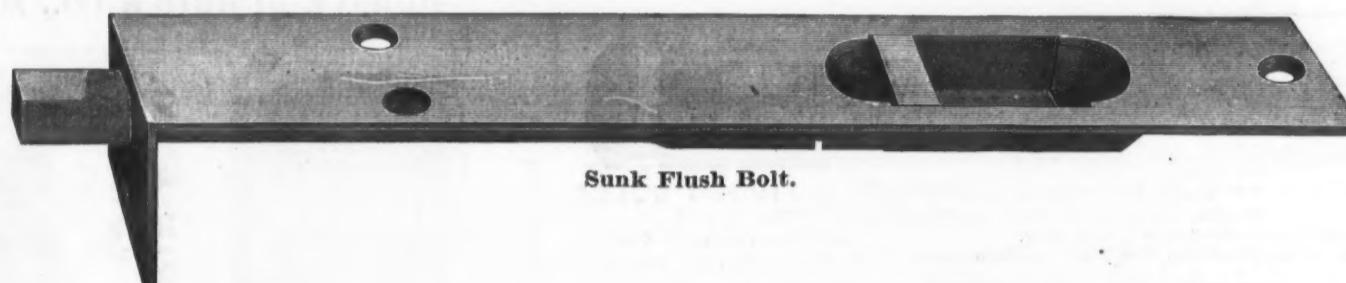
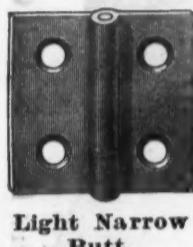
THE STANLEY WORKS,

MANUFACTURERS OF

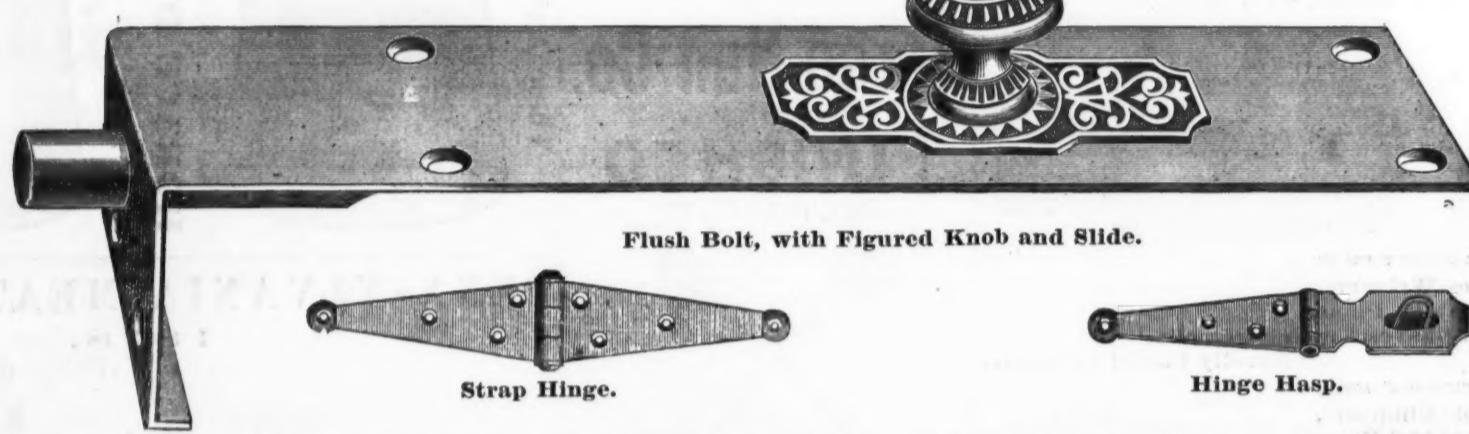
**Wrought Iron Butts, Strap and T Hinges, Flush Bolts and other
Door Bolts, Washers, Etc.**

FACTORIES, New Britain, Conn.

WAREHOUSE, 79 Chambers St., New York.



Sunk Flush Bolt.



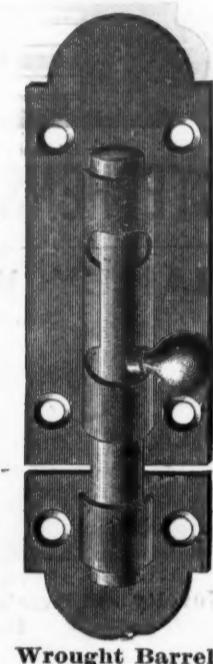
Flush Bolt, with Figured Knob and Slide.



Strap Hinge.



Hinge Hasp.



Wrought Barrel Bolt.

Can furnish **WROUGHT IRON BUTTS**, both **COMMON** and **BRIGHT** finish.

A Full Stock of Butts, Hinges and Door Bolts on hand, and can fill orders promptly.



COVERT'S HORSE AND MULE JEWELRY.

Consisting of Covert's Celebrated Harness Snaps, Swivel Snaps, Open Eye Bit and Chain Snaps, Snap and Thimble for Horse and Cattle Ties, Rope Goods consisting of Horse Ties, Cattle Ties and Halter Leads, Leather Horse Ties, Breast Chains, Halter Chains, Martingale Chains, Rein Chains, Post Chains, Post Racks, &c. These goods are far superior to anything of the kind on the market. They have from real merit become standard, and never fail to give entire satisfaction. They are sold by all leading jobbers in general and saddlery hardware at manufacturers' prices. Special attention is called to our new patented Rope Goods. No more braiding or winding ends with cord; all accomplished with machinery by clamping the rope with steel rings, which enables us to make better goods at reduced prices. Send for catalogue and price list. Address COVERT MFG. CO., Sole Manufacturers, Troy, N. Y.

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MADE BY THE VICTOR SEWING MACHINE CO.
Middletown, Conn.

This attractive and very desirable tool will be found more valuable and convenient than the Victor Caliper, and to Mechanics and Tool makers it is indispensable on work requiring very accurate and close measurement. Its capacity is one inch, and is graduated to one thousandths, but can readily be set one-half and quarter thousandths; and is so constructed that any wear resulting from use can be readily adjusted.

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Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

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Ink Stands of Superior Finish.

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Rings, Nutmeg Graters.

The Best American Cast Scissors and Shears.

FACTORIES, Wolcottville, Conn.

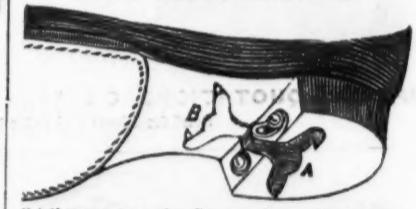
WAREHOUSE, 81 Reade Street, New York.



Best ever made for the price.

Both Floats revolve, giving the
double motion necessary to a per-
fect beater.

ICE CREEPERS.

Perfect Safety Secured in Walking on
Ice or Slippery Pavements.

"A" represents the Creeper in position ready
for use.
"B" shows the Creeper thrown back entirely
out of the way when not in use, or walk-
ing in doors.

This CREEPER has advantages over all others:
It is simple in construction, being easily ad-
justed, always ready for use, and when not needed
can be instantly turned under the "Shank" out
of the way, therefore not interfering with walking
in the house, on carpets, &c.

When in position for walking on ice it is a sure
protection from falling.

A sample pair will be sent by mail to dealers on
receipt of 25 cents; also terms and discounts for
quantities on application to

E. T. BARNUM,
118 and 120 Woodward Ave.,
DETROIT, MICH.

Agents wanted in every city.

THE SUGAR MAKERS' FRIEND

Over 2,500,000 in Use.



Post's Patent Bucket & Cover Attached.
More Strong and better
quality from EUREKA SAP
Shots than from ANY OTHERS.
Call for a sample of your Hardware Stores. Responsi-
ble Agents wanted. Send for a sample of our Patent
Bucket & Cover Attached. C. G. POST, Patentee, Burlington, Vt.



BUCK BROTHERS, Millbury, Mass.

The most complete assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels,
PLANE IRONS.

Gouges of all lengths and circles beveled inside or outside. Nail Sets, Scratch and Belt Awls, Chisel Handles of all kinds. Carving Tools. Also small Boxes of tools of best quality.

THE DEXTER CARRIAGE SPRING

Combines It is
Strength, Graceful,
Durability, Noiseless,
Beauty. Light and Easy.

The DEXTER SPRING is the most
perfect Carriage Spring ever invented.
Wherever it is known it is rapidly superseding
all others for pleasure vehicles. It is
especially recommended for use on the rough
roads of new countries, as its peculiar con-
struction relieves the strain on the vehicle
and shock to the passenger, while the high
grade of material used reduces the proba-
bility of breakage to a minimum.
For circulars, prices, &c., address

DEXTER SPRING CO., Hulton, near Pittsburgh, Pa., U. S. A.



The Patent Combined Dinner-Pail and Lantern.

The most perfect Dinner Pail
in the world. Hot coffee for
dinner and a Lantern at night.

Manufactured by JOS. HAIGHT,
PORT CHESTER, N. Y.
Sent by express on receipt of
\$1.00. Special attention given
to export orders. Travelling
Agents Wanted.

Goodell Company's Plated Table Cutlery.



The demand for a SUBSTANTIAL Table Knife has very naturally made an immense sale of solid steel handled plated goods. The great weight of these Knives and the extremely small size of the handles are serious objections. We are now making a Knife elegant in appearance, with a light and full-sized handle, and fully equal to the solid handle in every other essential particular. They are plated with pure silver in the best possible manner, and prices are "rock bottom" for a genuine article. We are also making several other styles of Plated Cutlery.

Correspondence solicited.

GOODELL COMPANY, Antrim, N. H.



Manufacturers of
COOPERS' TOOLS AND STAVE KNIVES,

Made from the best English Steel, and are warranted not to be soft and to be clear from flaws in the Steel. The proprietors, after many years' experience, are enabled to furnish work of the best finish and quality, at lowest rate. We make all kinds of Knives for which a pattern is furnished. For price list apply to

M. GREGG & SON, Rochester, N. Y.

STILES' IMPROVED PATENT POWER SHEARS.



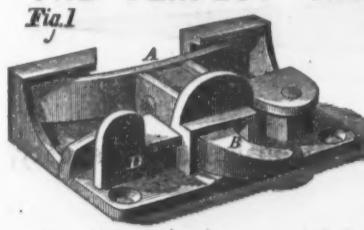
Will Cut all kinds of Sheet Metal.

They are made extra strong. In their manufacture no expense has been spared either in material or workmanship. They are furnished with front and back gauges. We also make, when ordered, in place of the ordinary back gauge, one moved with screws, and graduated so it can be set to any part of an inch.

We make three sizes, to cut sheets 30, 36 and 42 inches wide, up to 3-16 inch thick.

STILES & PARKER PRESS CO.,
Middletown, Conn.

THE PERFECT SASH TIGHTENER AND LOCK.



Manufactured entirely from Malleable Iron, Burglar Proof, Anti-Battling, Draws Sash to Exact Center. No Springs to Get out of Order.

The Best in the Market.

METALLIC CLOTHES PIN.

For either Wire or Rope Line, Will securely hold any article, from a silk handkerchief to a carpet. No article can be blown away. Does not soil the clothing. Manufactured by CLARK & SMITH, Patentes, Chester, Orange Co., N. Y. SOLE AGENTS, J. I. BROWER & SON, 286 Greenwich St., New York, 25 and 16 inch, Maharan's #10 Tire Shriner, Heller's Rasp. Send for Circular. SPECIAL DISCOUNTS TO JOBBERS.

NOTICE

TO THE

Hardware Trade

in all Parts of the

WORLD.

You are hereby NOTIFIED that from this date on, December 2, 1878, the

Patent "Eclipse" Fan

Blower,

Tire Benders,

Centennial Jump Seat

Irons,

AND THE

Scandinavian Jail Pad Locks

will be offered at a BARGAIN and all goods GUARANTEED.

AGENCIES SOLICITED at home and abroad on easy terms.

Address the Manufacturer,

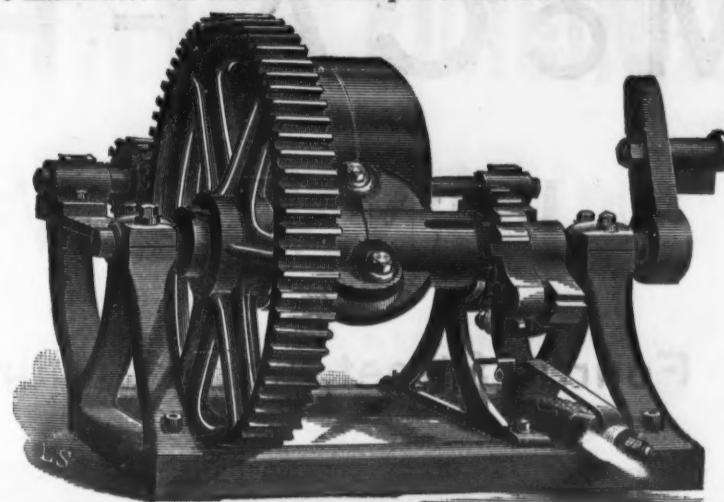
EZRA F. LANDIS,

Lancaster, Penn.,

U. S. A.

MILO PECK'S POWER LIFTER,

Invented over a quarter of a century ago, has been improved from time to time, steadily keeping the lead, and is in use to-day in more manufactoryes than all other power lifters combined.



This Lifter can be applied to any Drop in use, and does not require any attachment bolted to either hammers or uprights.

Peck's Drop Press a Specialty.

Eleven regular sizes, both for stamping sheet metals and for forging Hammers from 50 lbs to 2500 lbs. Send for 1879 illustrated price sheet.

BEECHER & PECK,

157 Temple Street, - New Haven, Conn., U. S. A.



Before making arrangements for Lawn Mowers for the coming season you will do well to correspond with

OHIO MANUF'G CO.,

71 Central Way, CLEVELAND, OHIO.

MAKERS OF THE

Least Complicated, Lightest Running and Best Lawn Mower ON THE MARKET.

EXCELSIOR FILE WORKS.



G. F. STOTT, Proprietor,

Rochester, N. Y.

ESTABLISHED 1854.

SHELTON & CO.,

Manufacturers of every variety of



Carriage, Tire, Machine, Plow, Stove and Spring Bolts, Coach and Bed Screws, &c.

BIRMINGHAM, CONN.

GEO. N. PIERCE & CO.,

Buffalo, N. Y.,

Sole Manufacturer of the

Celebrated "Gem" Coal Hod.

Patented September 21st, 1875.

These Coal Hods are made in three styles, Japanned, Bronze Band and Galvanized, and in five sizes, viz., 15, 16, 17, 18 and 20 inch. They are all made of Refined Iron, with bottoms double seamed and the rims riveted to the body of the Hod. We also manufacture a large assortment of House Furnishing Goods. Send for illustrated catalogue and price list.

McCAFFREY & BRO.,

PENNSYLVANIA FILE WORKS,

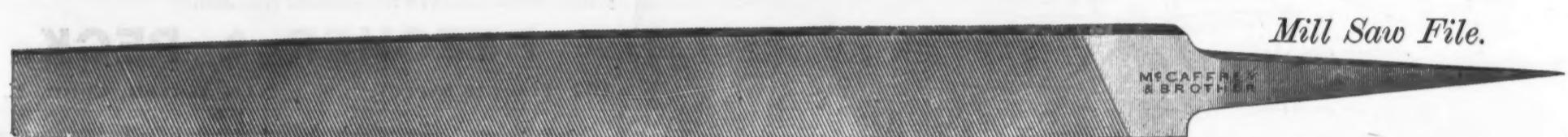
Fourth Street, north Columbia Avenue,

PHILADELPHIA.



Hand Bastard, 8In.

MCCAFFREY & BRO.



Mill Saw File.

MCCAFFREY & BRO.



Round File, Bastard, 8In.

MCCAFFREY & BRO.



PHILADELPHIA,



Taper Saw File, 4 1/2In.

MCCAFFREY & BRO.



1876.



Band Saw File.

MCCAFFREY & BRO.



PARIS,

FRANKLIN INSTITUTE,



1870

TRADE MARK.



1874.



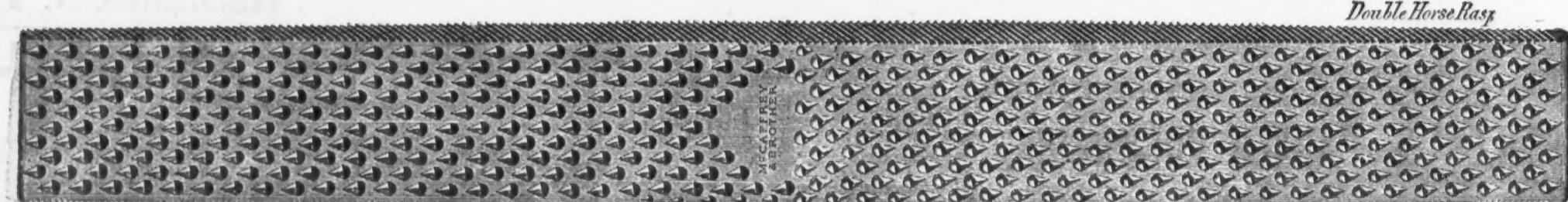
To
McCaffrey & Bro.
Philadelphia
for
Files and Raspbs
1874.



1878.

Four-Square File, Bastard, 8In.

MCCAFFREY & BRO.



Double Horse Rasp.



Flat File, Bastard, 8In.

MCCAFFREY & BRO.

In calling the attention of the Trade to our brand of FILES and RASPS, we have the satisfaction of knowing that since our establishment in January, 1863, our relations have been of the most friendly kind, and return our sincere thanks to our patrons for their encouragement.

We have far exceeded our expectations of giving our customers a FILE and RASP that could not be excelled. Our many specialties, exclusive attention and practical experience have enabled us to put upon the market a FILE and RASP that for durability and excellence there is not an equal at present in existence.

We were awarded the Medal for Superiority, being the highest prize for Files and Raspbs at the Exposition Universelle, Paris, 1878; and wherever exhibited our goods have taken the first premium.

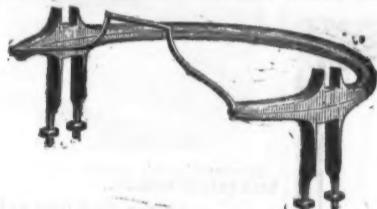
Our customers may depend that our efforts shall not be relaxed in keeping up our hard-earned reputation, and ahead of competition in our line. Would be pleased if foreign as well as domestic buyers would allow us to compete for their trade, by placing at least a portion of their orders with us.

SPECIALTIES IN CARRIAGE HARDWARE FORGINGS

MANUFACTURED BY

WILCOX & HOWE,
BIRMINGHAM, CONN.

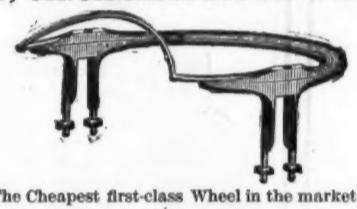
No. 1, DERBY FIFTH WHEEL.



No. 2, DERBY FIFTH WHEEL.

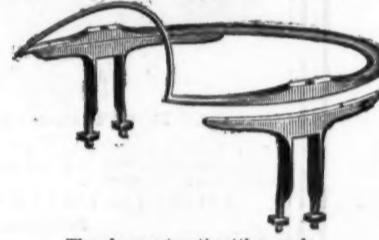


No. 3, CINCINNATI FIFTH WHEEL.



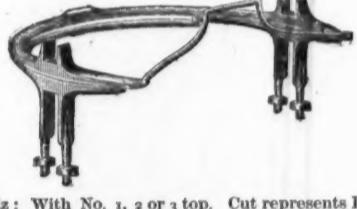
The Cheapest first-class Wheel in the market.

No. 4, OHIO FIFTH WHEEL.



The cheapest anti-rattler made.

LARKIN'S PATENT ANTI-RATTLER FIFTH WHEEL.



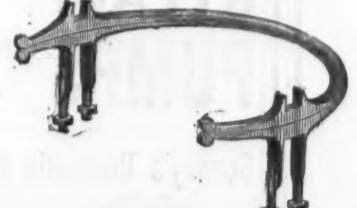
Three styles, viz: With No. 1, 2 or 3 top. Cut represents Derby No. 1 top, with extra square, or spot for reach. Nos. 5, 6 and 7.

No. 8, FIFTH WHEEL.



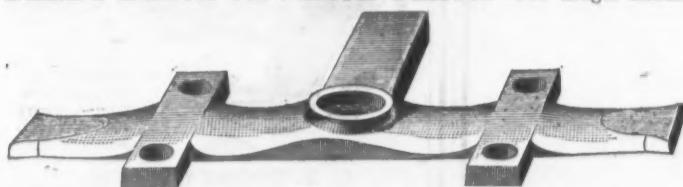
With Derby Top. Also made with Nos. 1, 2 or 3, or Scroll Top Wheel. Be particular in ordering.

No. 9, FIFTH WHEEL.



With Derby Top. No. 10 has Cincinnati Top, with scroll ends. Also made without scroll ends on bottom wheel.

DERBY REACH OR PERCH PLATE.—For Single Reach.



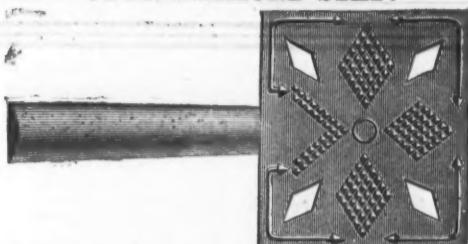
The above cut represents the under side.

This is forged from a solid bar of best Norway Iron, and the ends are left long enough to answer for any diameter of Fifth Wheel. The center hole is made to accurately fit king bolt. Also made for Double Reach.

DERBY REACH PLATE.
With Putnam's Patent Fifth Wheel Guards.

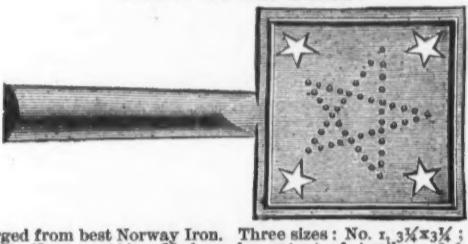
This invention, used in connection with Wilcox's Patent Fifth Wheel Anti-Rattler, prevents any danger of accident from the breaking of king bolt.

OPEN DIAMOND STEP.



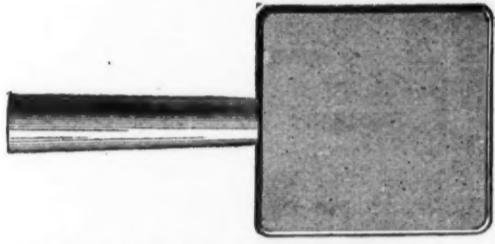
Forged from best Norway Iron. Three sizes: No. 1, 3x3 1/2; No. 2, 3 1/2x4; No. 3, 4x4 1/2 in. Made under patent of April 1, 1876. Also made without open diamonds in corners.

OPEN STAR STEP.



Forged from best Norway Iron. Three sizes: No. 1, 3 1/2x3 1/2; No. 2, 3 1/2x3 1/2; No. 3, 4x4 1/2 in. Made under patent of April 1, 1876. Also made without open stars in corners.

PLAIN STEP.



Made from best Refined Iron. The cheapest and best Plain Step made. Three sizes: 3x3 1/2, 3 1/2x4, and 4x4 1/2 in.

SHORT JOINT EYES.



Round or Oval, 3/8 to 9-16 in. hole for prop. Four dozen in a box.

LONG JOINT EYES.



Sold in sets. Round Joint Eyes are made from 7-16 and 1/2 in. iron. Oval Joint Eyes from 1/2, 9-16, 3/8, 1/4 in. iron. Size of hole for prop, 3/8 to 9-16 inch. In ordering, state what prop you use.

WHIFFLETREE COUPLING.



Top plate, bolt and clip made in one piece, from best Norway Iron. Patented February 18, 1876. One dozen in a box.

IMPROVED BODY LOOP.



Patented May 28, 1869. Five sizes: for 3/8, 1/2, 1, 1 1/4 and 1 1/2 in. spring bar. 3/8 in. has 1/8 in., 1/4 in. and 1 in. have 5-16 in. and 1 1/4 and 1 1/2 in. have 3/8 in. hole for bolt. Made from best Norway Iron. Two doz. in a box.

ONE LIP BODY LOOP.



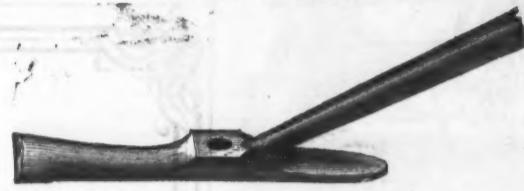
Made from best Norway Iron. Three sizes: for 3/8, 1 and 1 1/4 in. spring bar. 3/8, 5-16 or 3/8 inch hole, as ordered. Two doz. in a box.

WILCOX'S PATENT FIFTH WHEEL ANTI-RATTLER.



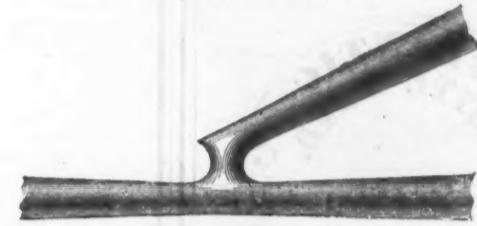
A represents rivet, and B, rubber which placed in recess makes a perfect Anti-Rattler. For 3/8 and 1/2 Fifth Wheels.

No. 1, STAY-END.



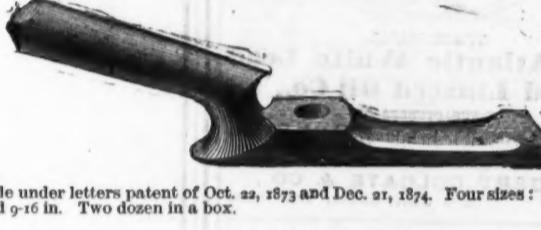
Made from one piece of best Norway Iron, under letters patent of Oct. 22, 1873, and Dec. 21, 1875. Two sizes: 3/8 and 7-16, and 1/2 in. Two dozen in a box.

No. 2, OFFSET.



Forged from one piece of Norway Iron. Made under patents of Oct. 22, 1873, and Dec. 21, 1875. Four sizes: 3/8, 7-16, 1/2 and 9-16 in. Two dozen in a box.

No. 3, STAY-END.



Made under letters patent of Oct. 22, 1873 and Dec. 21, 1875. Four sizes: 3/8, 7-16 and 9-16 in. Two dozen in a box.

No. 4, NEW STAY-END.



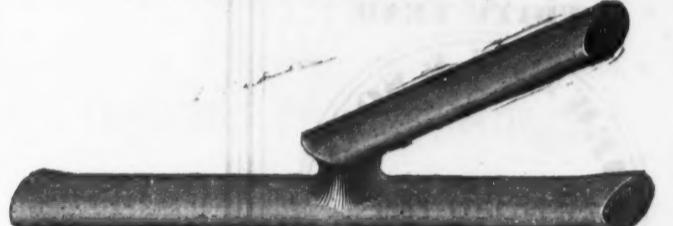
Made from best Norway Iron, under letters patent of Sept. 1, 1874. Desirable for plain work. Four sizes. Two dozen in a box.

No. 6, NEW OVAL STAY-END.



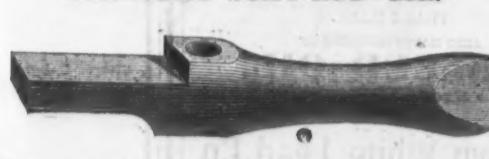
Made from best Norway Iron, under letters patent of Sept. 1, 1874. Five sizes: 9-16x3/8, 3/8x3/8, 3/8x7-16, 7-16x3/8 and 1x3/8 in. Two dozen in a box.

No. 7, NEW OVAL OFFSET.



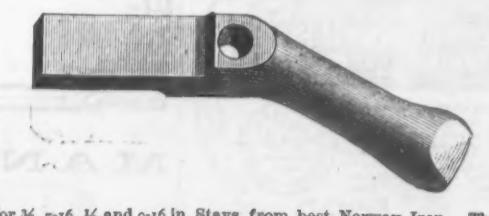
Made from best Norway Iron, under letters patent of Sept. 1, 1874. Five sizes: 9-16x3/8, 3/8x3/8, 3/8x7-16, 7-16x3/8 and 1x3/8 in. Two dozen in a box.

STRAIGHT STAY-END TIE.



Made for 3/8, 7-16, 1/2 and 9-16 in. Stays, from best Norway Iron. The shape is such that it can be used with Round or Oval Stays. The back hole can be drilled to fit any size of axle. Two dozen in a box.

BENT STAY-END TIE.

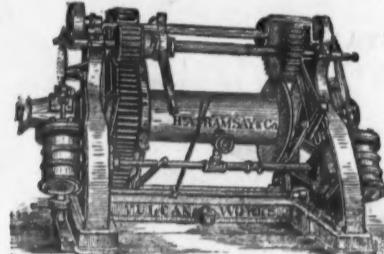


Made for 3/8, 7-16, 1/2 and 9-16 in. Stays, from best Norway Iron. The shape is such that it can be used with Round or Oval Stays. The back hole can be drilled to fit any size of axle. Two dozen in a box.

Send for our Illustrated Catalogue of 1878; the most complete Catalogue of Forged Carriage Irons yet published. All goods of our manufacture are fully warranted.

RIEHL BROS.
Office and Works, 9th St., above Master, Phila.
Warehouses, to & 425, 4th St., above Chestnut, Phila.
New York Store, 91 Liberty Street.

STANDARD SCALES AND TESTING MACHINES
Patented Furnace Charging Scale.
Double Beam R. R. Track Scale, Compound Parallel Crane Beams, &c. Patented First Power Lever Wagon Scales. Testing Machines any capacity.
Send for Illustrated Price List.



The "Ramsay Improved Steam Winder,"
Manufactured by H. A. RAMSAY & CO.,
Vulcan Iron Works, Baltimore, Md.



The Atlantic White Lead and Linseed Oil Co.,
Manufacturers of White Lead (Atlantic), Red Lead, Litharge & Linseed Oil.
ROBERT COLGATE & CO., 287 Pearl Street, New York.

John T. Lewis & Bros.,
No. 231 South Front St.,
PHILADELPHIA.



Pure White Lead, Red Lead, Litharge, Orange Mineral, Linseed Oil, AND PAINTERS' COLORS.

JOHN JEWETT & SONS,
Manufacturers of the well-known brand of
WHITE LEAD.



ALSO MANUFACTURERS OF
LINSEED OIL.
182 Front Street, NEW YORK

Brooklyn White Lead Co.



White Lead, Red Lead & Litharge.
90 Maiden Lane, NEW YORK.
FISHER HOWE, TREASURER.

DUC'S IMPROVED ELEVATOR BUCKET.

Made of Best Charcoal Stamping Iron.

No Corners to Catch.

Light Running and Very Durable.

The only Scientifically Constructed Elevator Bucket in the Market.



THE STORE-HOUSE BUCKET.
(Partial straight front.)
In 12 in., 14 in., 16 in. and 17 in. Sizes.

CONTINENTAL WORKS
Send for Circular.



MILL BUCKET.
In 3 1/4 in. to 10 in. Sizes.

T. F. ROWLAND,
Sole Manufacturer,

CONTINENTAL WORKS, Brooklyn, E. D., N. Y.

THE "OLD RELIABLE" UNIVERSAL Clothes Wringer.



Improved with Rowell's Double Cog-Wheels on both ends of each roll.

Over 500,000 sold!

And now in use, giving "Universal" satisfaction.

EVERY WRINGER WARRANTED.

Be sure and inquire for the "Universal."

Sold by the Principal Jobbers in Hardware and House-Furnishing Goods everywhere.

Special rates given for export.

Metropolitan Washing Machine Co.

32 Cortlandt St., New York.



ROUND PLATE.

The Hardware Trade having been 6000 years without a good Caster, is it not time that it deserved one? We offer it.

PHOENIX CASTER CO.,
Indianapolis, Ind.

TUCKER & DORSEY,
MANUFACTURERS.



Our Lock has no Rival

PHILADELPHIA HYDRAULIC WORKS,
Evelina and Levant Sts.,

General Machinists

and Manufacturers of
Steam Pumps and Steam Fire Engines.

STEAM PUMPS
Manufactured by
Crane Bros.,
Mfg. Co.
CHICAGO.

Bonney's Domestic Parallel Vise,

With Clamp attachment, for Amateur Mechanics, Family use, &c. Over 12,000 already sold. Prices reduced. List price: No. 1, 1/2 in. jaw, \$5; No. 2, 2 in. jaw, \$12; No. 3, with patent swivel jaw, 2 in. jaws, \$15.
C. S. BONNEY & SON,
4741 Paul St., Frankford, Phila.

UPRIGHT DRILLS.

NEW PATTERNS,
Geared Head.
Three-Change Geared
FEED
for
HAND AND POWER.
Quick return to spindle.
A Splendid Tool,
CHEAP.
Send for Circular.
EDWIN HARRINGTON
& SON,
Manufacturers of
MACHINISTS' TOOLS,
Cor. of North Fifteenth St.
and Pennsylvania Ave.
Philadelphia, Pa.

MANUFACTURERS' SUPPLIES.
The Best and Lowest Price.



H. A. ROGERS, 19 John Street, New York.

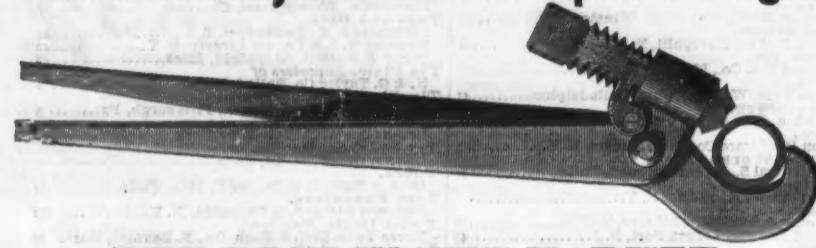
A few doors from Broadway.

Steam Gauges, Belting, Chucks, Drills, Packing, Governors, Jacks, Oil Cups.
STEAM PUMPS for Pumping, Fire Purposes and Boiler Feeding.

Also VALVES, PIPING and VISES.

The Largest Stock in the City,

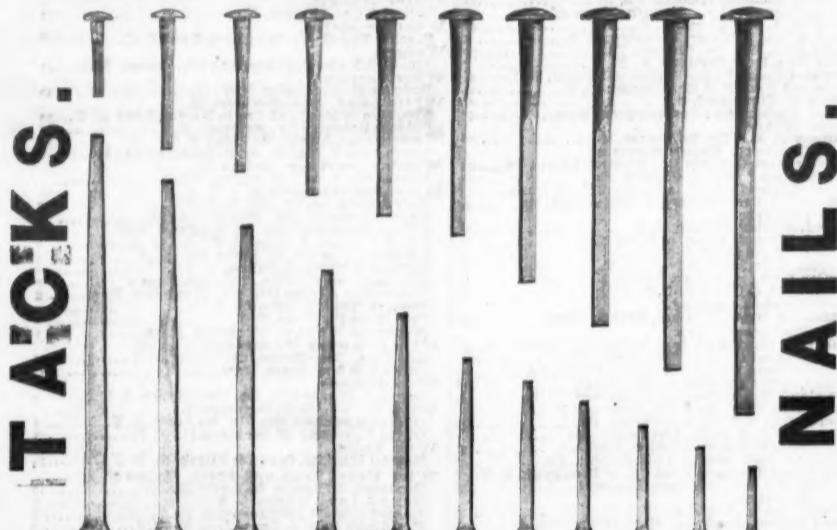
JESSOP'S Patent Adjustable Pipe Tongs.



THE BEST IN THE MARKET.

Send for Samples.

EATON, COLE & BURNHAM COMPANY,
Sole Manufacturers,
58 John Street, New York.



TACKS and SMALL NAILS Of Every Kind.

COPPER, ZINC, STEEL & SWEDES & COMMON IRON SHOE NAILS, &c.
Copper, Iron and Galvanized Boat Nails,

Regular or Chisel Pointed.

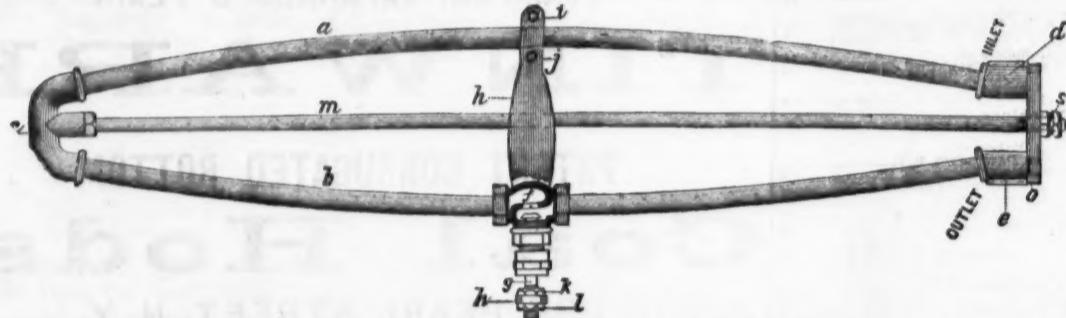
Brass & Iron Wire Nails, Moulding Nails and Escutcheon Pins, Chair & Cigar Box Nails, 2d & 3d Fine Nails, Roofing Tacks and Nails, &c., &c.
MADE BY THE

AMERICAN TACK CO., Fairhaven, Mass.

A full line of goods may be found at our

NEW YORK SALESROOM, No. 117 Chambers Street

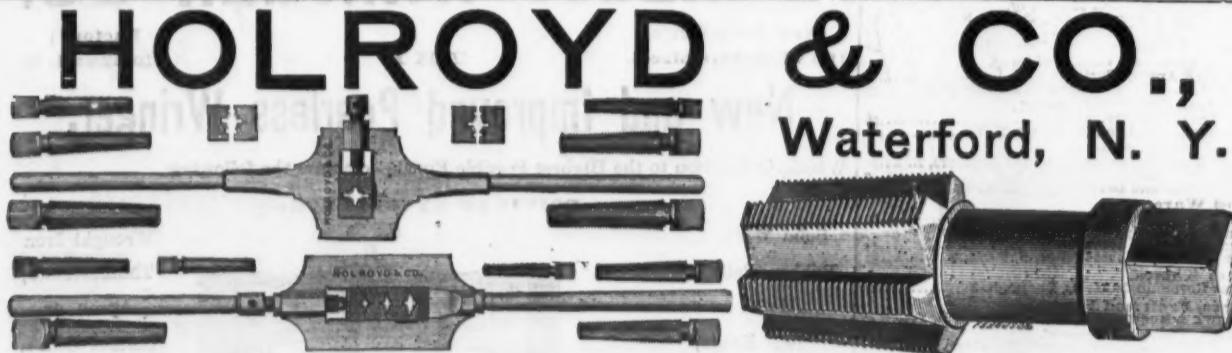
BARR'S ELLIPTIC STEAM TRAP.



Has no floats or concealed parts to get out of order. Can be set to discharge water at any desired temperature. Once adjusted, never needs the slightest attention, being ABSOLUTELY AUTOMATIC in action. Never FREEZES in exposed situations, such as Rolling Mills, Hammer Shops, &c. Simplest in construction of any trap made. Has no reservoir in which to accumulate condensation, but discharges incessantly. Can be set in any position, either side or end up, without altering its working. Occupies less space, and being so light, can be used in situations where no other can.

Send for Circular to manufacturers,

PANCOAST & MAULE, 243 and 245 South Third St., Philadelphia, Pa.



CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other
Two sizes: Large Size Boring, $\frac{3}{8}$ to 8 inches; Small Size Boring, $\frac{3}{8}$ to $1\frac{1}{8}$ inches.

W. A. CLARK'S PATENT.

Manufactured by

WILLIAM A. CLARK.

Westville, Conn.

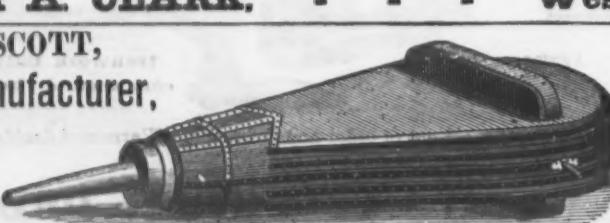
GEO. M. SCOTT,

Bellows Manufacturer,

Johnson Street,

Cor. 22d St.,

CHICAGO, ILL.



H. PRENTISS & COMPANY,

Sole Manufacturers of
Goddard's Patent-Relieved Machinists', Blacksmiths' and Gasfitters' Taps. Solid Reamers, Screw Plates and Dies.

Headquarters for Biltmore & Spencer's Cut-off
Drills, Chuckas, Machine Set and Cap Screws, &c.

Dealers in Machinists' Supplies.

14 DEY STREET, New York.



HAND FREEZER.

2 to 25 qts.
\$3.50 to \$25.00



HAND OR POWER.

25 and 50 qts.
\$75.00 and \$175.00



HAND OR POWER
ICE CRUSHER.

\$75.00

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Galvanized iron outside, tin inside. No secretions of zinc need be feared in the use of this Freezer.

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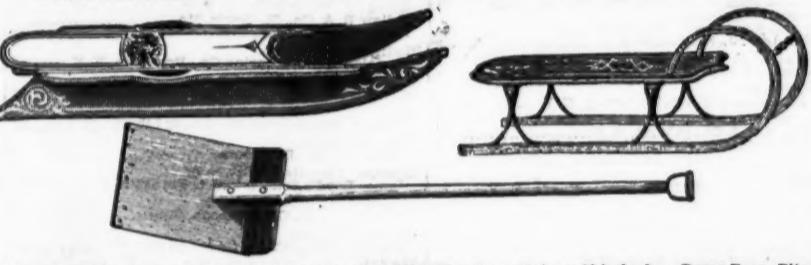
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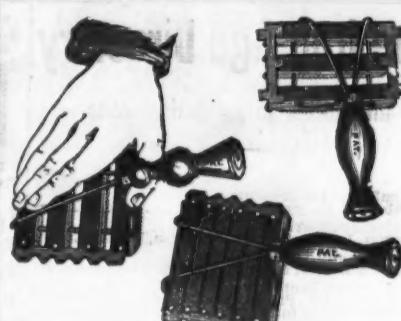
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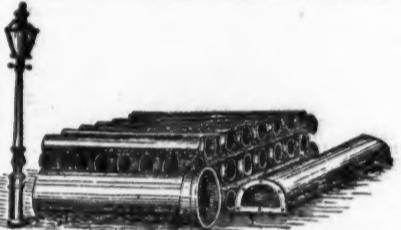
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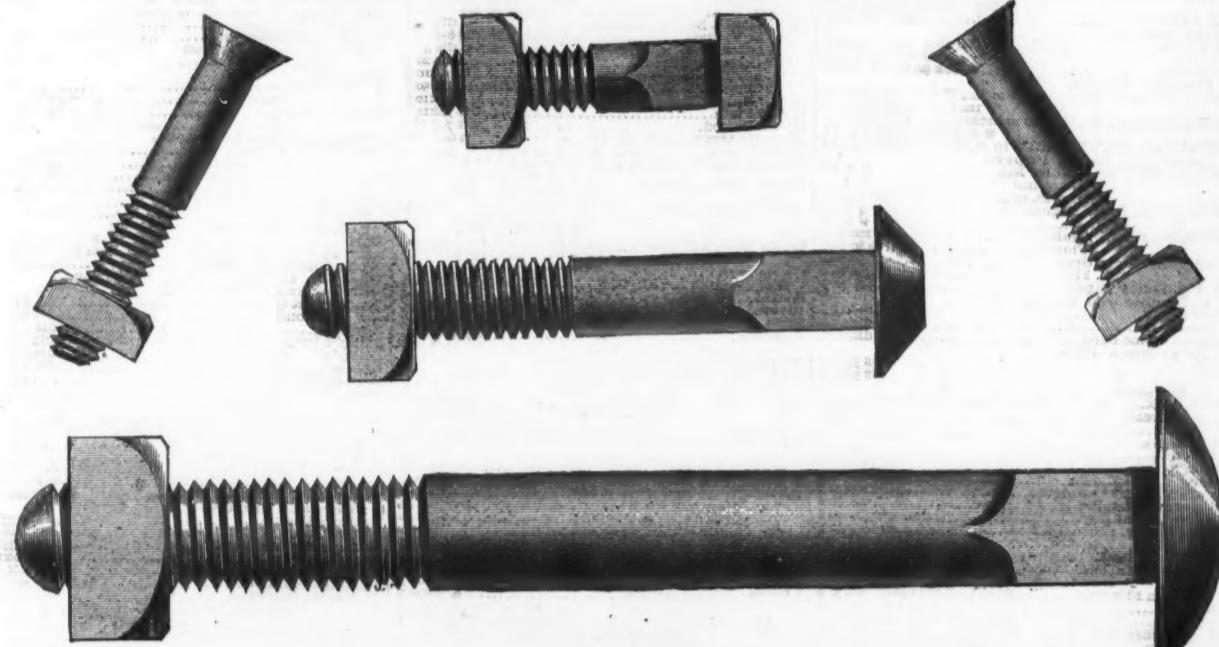
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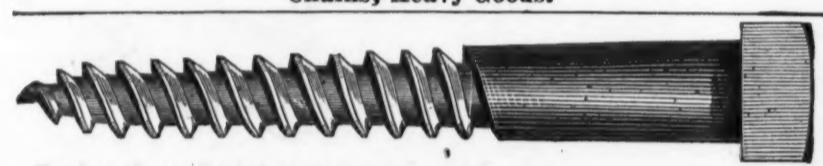
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We always have on hand a full assortment of German and English Hardware, Cutlery, Guns, Gun Material, Chains, Heavy Goods.



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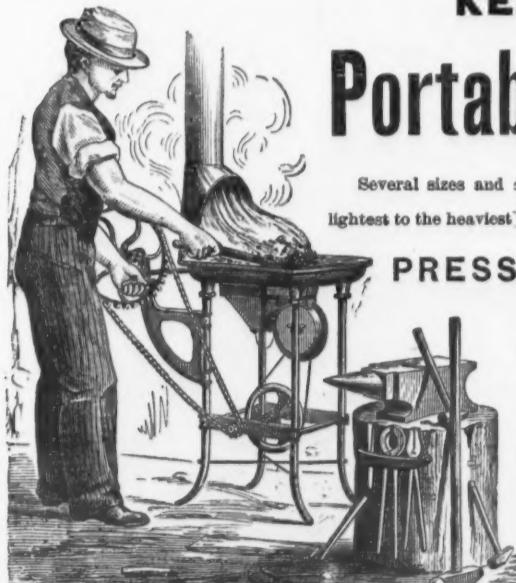
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Machine and Plow Bolts,
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Portable Forges.



Several sizes and so styles, for every purpose from the lightest to the heaviest work. Also

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Sizes from six inches to six feet.

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Simple, Strong, and Cheap in Price.
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We have no hesitation in recommending it in the highest terms.

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It far excels any machine for the purpose which has come under my observation since its first appearance of over 30 years.

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It proved to be one of the best labor-saving machines that I know of, for the amount it cost.

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Prices per doz., \$24, \$27, \$33, with good pans.

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HORSE CLIPPERS.

The cutting parts are made of the very best English Cast Steel. The upper knife passes over two teeth. There is a protecting plate which gives the Clipper great strength. The iron parts of the handles are all wrought, not malleable, iron, and adjusted so that there is no danger of the handles getting broken. Every Clipper is carefully examined before leaving the factory. Quick and easy working can be guaranteed.

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OUR TOY SCALE, TO PLAY STORE WITH.**

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Of every description, including

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Of all description.

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STEAM COOKER

Every variety of Meats,
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Emits no offensive odor,
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Ten Pins and Balls constantly on hand. Lignumvitae for sale by the ton or pound. All orders large or
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complete, from Rods to No. 40 Wire, is manufac-
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Fine Mandrel Drawn Tubes, of all sizes and
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We call the attention of all to
the use of large buildings, and the
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above article. It is superior to
slate, cheaper, fire proof, about one-fourth the weight,
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Patented Hardware Manufacturers and Iron Founders.

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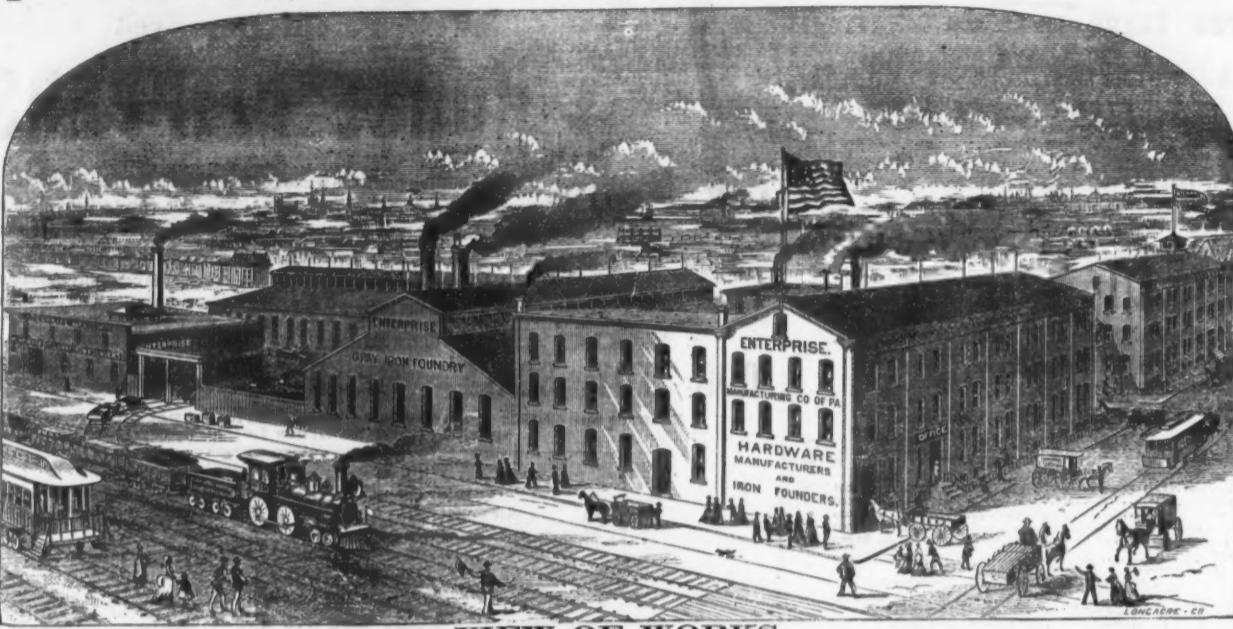
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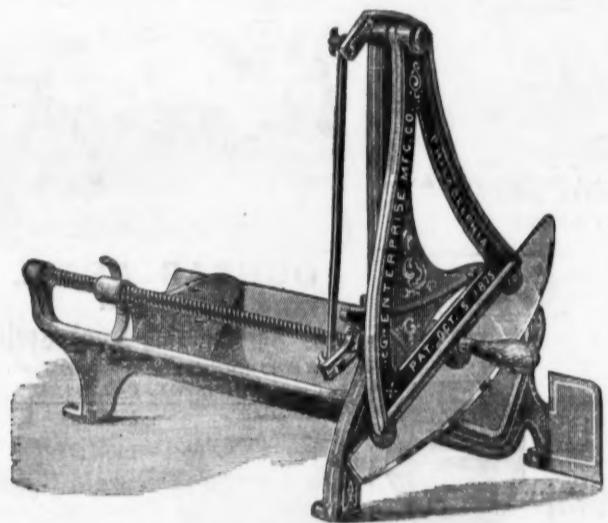


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Patent Self-Measuring Faucet,
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Price, \$6.00.

Warranted the Best and Cheapest in the Market.



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Combined Sausage Stuffer, Fruit, Lard
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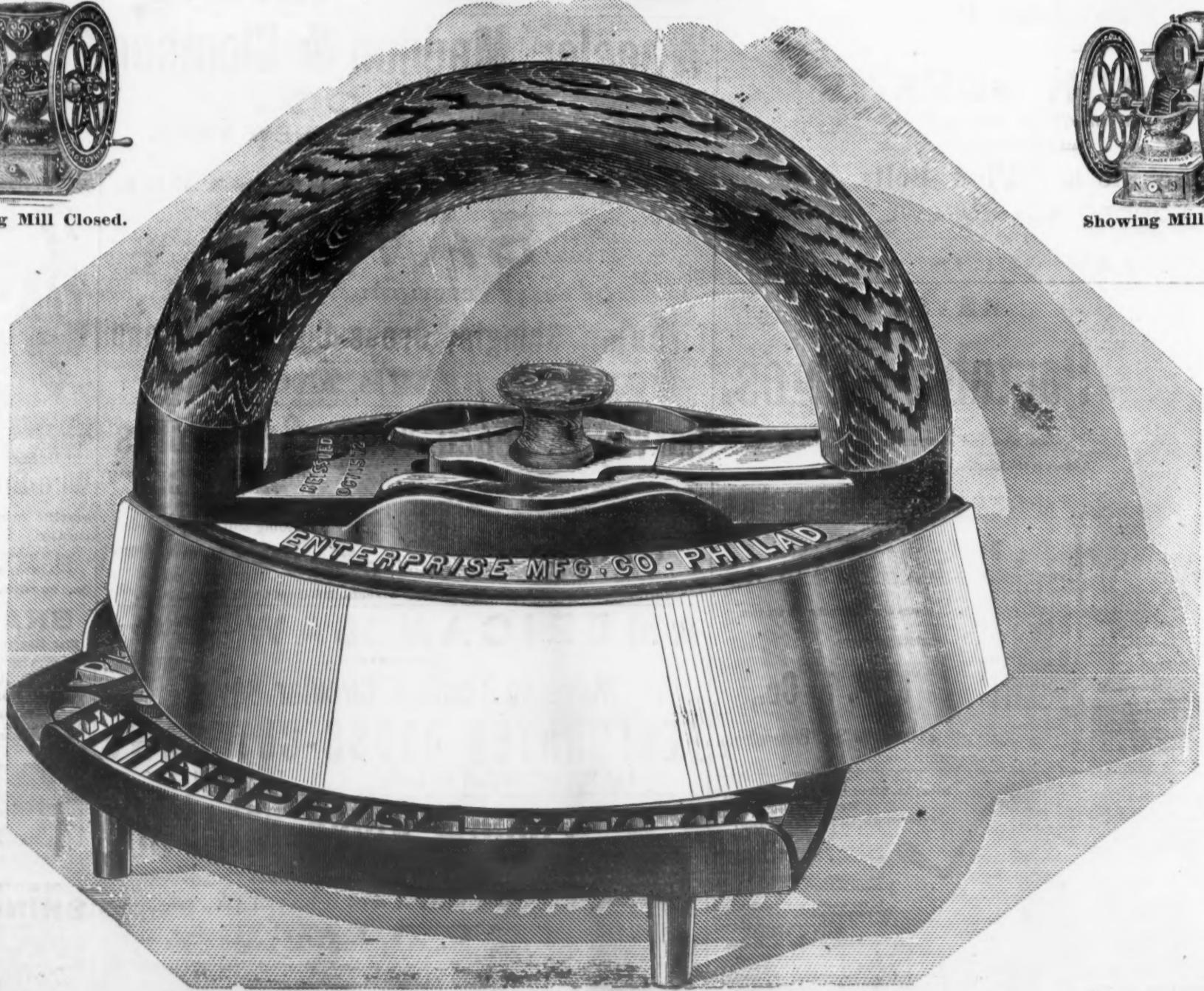


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THREE IRONS, ONE HANDLE AND A STAND CONSTITUTE A SET.

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Terms 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Axes.
Frost Wright's, 2 lb. gold, 10¢;
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Winkinson's, 2 lb. gold, 11¢ net.
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Reading No. 72, per doz. \$ 5 00 net;
" 74, " 7 00 net;
" 76, " 7 50 net;
" 78, " 8 00 net.
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Little Favorite, corer and sifter, 7 50 net.
Lots of 10 to 25 dozen special price.

Axes.
Man's Red Warrier, per doz. \$ 8 50 @ 9 00 net.
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Crown Prince, " 9 50 @ 10 50 net.

Augers and Auger Bits.
Batch and Augers, dis 10¢@ 10 50%; case 50, 108¢@ 11 50%; Augers, 15¢.

Watrous Ship Augers, 15¢.

Benjaming Pierce Auger Bits, 10¢.

Griswold Auger Bits, 10¢.

Cook's, 10¢.

Connings', 10¢.

Bonney's Pat. Bol. Augers, list \$ 8 50; dis 25¢@ 10 50%; Stearns' Pat. Bol. Augers, " 8 50.

Balances.
Light and "Common", 25¢@ 10 50%; All other Spring Balances, 25¢.

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Chambers' No. 1 for 1/4" bolts, each \$ 7 50; dis 25¢@ 8 50%; " 2 1/2", " 12 00; " 3", " 12 00.

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Cast Fast Joint, Narrow, Broad, " 75¢@ 10 50%; Cast Loose Joint, Narrow, " 75¢@ 10 50%; " Broad, " 75¢@ 10 50%; " Acorn, Loose Jap'd, " 75¢@ 10 50%; " Acorn, Medium Jap'd, " 75¢@ 10 50%; Maylo Loose Joint, " 75¢@ 10 50%; Wrought Loose Joint, " 75¢@ 10 50%; Table Hinges and Back Flaps, " 75¢@ 10 50%; Narrow, Fast, " 75¢@ 10 50%; Narrow Joint, " 75¢@ 10 50%.

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Compact, Practical, Durable and Economical.

Acknowledged to be the best in use. This boiler stands unrivaled.

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Stationary Engines and Boilers.

Also Machinery for Mills of all kinds and Tanneries. Also their celebrated Bark Mills, acknowledged to be the best. Send for reduced price list circular.

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SAFETY STEAM BOILER.

The Boiler that made the Best, Dryest, Hottest and Greatest Quantity of Steam per pound of coal at the Centennial Exhibition, and received the Highest Award therefor.

A DIPLOMA AND MEDAL.



AND HAS THE FOLLOWING SUPERIOR ADVANTAGES:

No cleaning of flues, no hard firing caused thereby, and no corrosion caused by the accumulation of soot. Safety from disastrous explosion. The Utmost Durability. Economy, being the most economical boiler in the world. No foaming or priming; entirely dry steam.

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LIGHTNING HAY KNIVES,

WEYMOUTH'S PATENT.



This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes.

The blade is best cast steel, spring temper, easily sharpened, and is giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and seems destined to take the place of all other Hay Knives.

They are nicely packed in boxes, one dozen each, of 50 lbs. weight, suitable for shipping by land or water to any part of the world.

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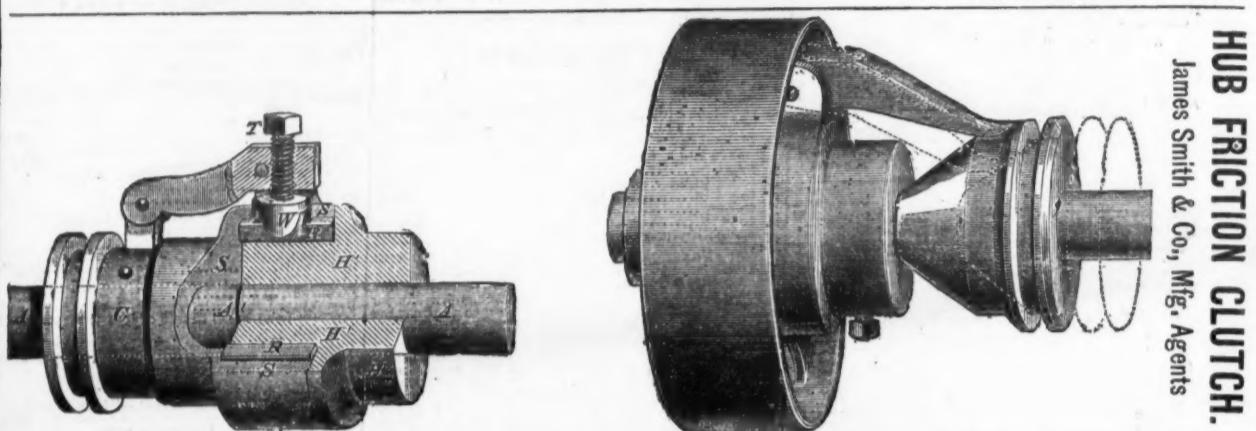
East Wilton, Franklin Co., Maine.

For sale by the Hardware Trade generally.

SEMPLE & HIRGE MFG. CO., Agents at St. Louis.



PATENT
Expanding, Self-Draining
RUBBER BUCKET.
Manufactured only by
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PATENT HUB FRICTION CLUTCH.

Manufactured by the HUB FRICTION CLUTCH CO., Limited, Philadelphia.

We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.

For sale by GEO. V. Cresson, Philadelphia; MORTON, REED & CO., Baltimore.

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THE EAGLE ANVIL !! WARRANTED !!



(ESTABLISHED) 1843.

These Anvils are superior to the best English, or other Anvils, on account of the peculiar process of their manufacture invented and used only by this concern, and from the quality of the material employed.

The best English Anvils become hollowing on the face by continued hammering in use, on account of the fibrous nature of the wrought iron—causing it to "settle" under the face.

The body of the Eagle Anvils is of crystallized iron, and no settling can ever occur; the steel face, therefore, remains perfectly true. Also, it has the great advantage, that being of a more solid material, and consequently with less rebound, the piece forged receives the full effect of the hammer, instead of a part of it being wasted by the rebound, as of a wrought iron anvil. An equal amount of work can, therefore, be done on this Anvil with a hammer one-fifth lighter than that required when using a wrought iron anvil.

The work is made of the process of James's Best Tool, Cast Steel, which, being accurately ground, is hardened and given the proper temper for the heaviest work. The Horn is covered with and its extremity made entirely of steel.

The body of the Anvil is of the strongest grade of American iron, to which the cast steel face is warranted to be thoroughly welded and not to come off.

Price List, October 1st, 1876. ANVILS weighing 100 lbs. to 800 lbs. &c. per lb.

Smaller Anvils, ("Minims")

No. 60 10 lb. 15 lb. 20 lb. 25 lb. 30 lb. 40 lb. 50 lb. 60 lb. 70 lb. 80 lb.

Weighing about \$2.75 \$2.75 \$4.00 \$4.50 \$5.25 \$6.00 \$6.50 \$7.25 \$8.00 \$8.50

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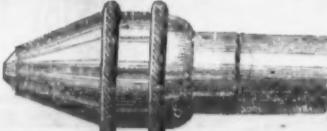
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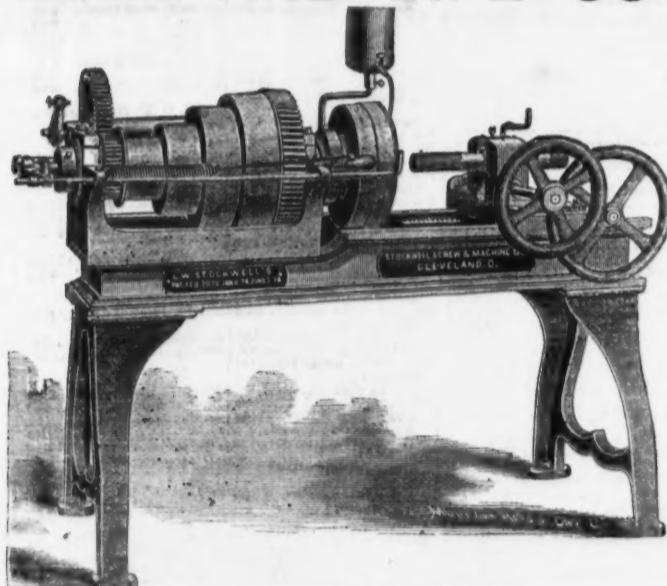
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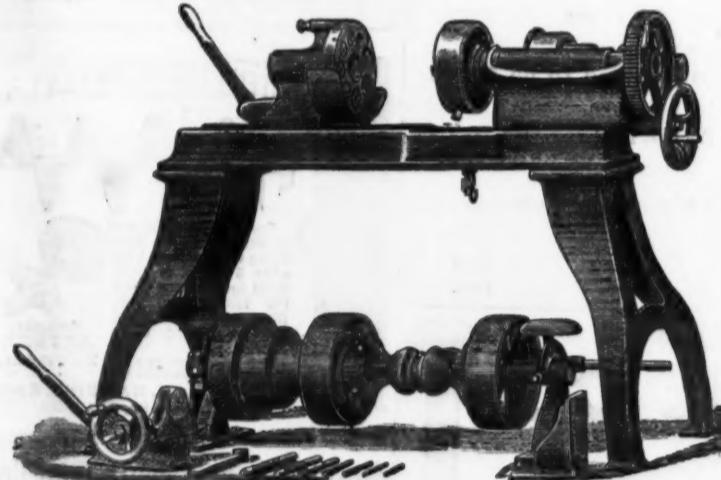
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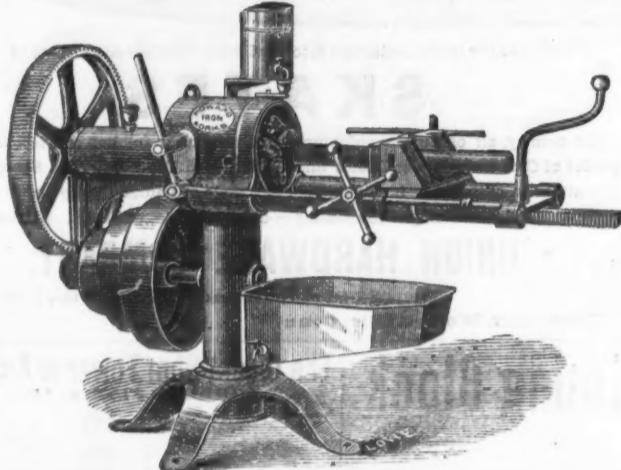
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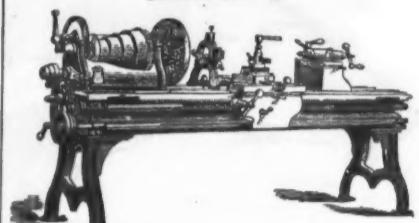
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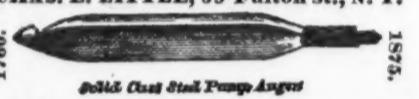
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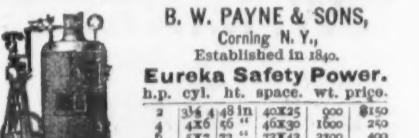
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8	36.00	41.00	3.50	11.00	
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10	45.00	52.00	4.25	14.00	
11	54.00	62.00	4.50	17.00	
12	64.00	73.00	5.00	21.00	
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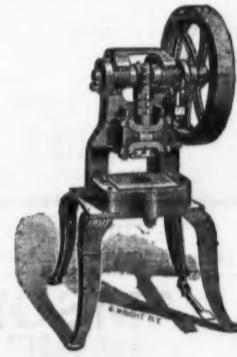
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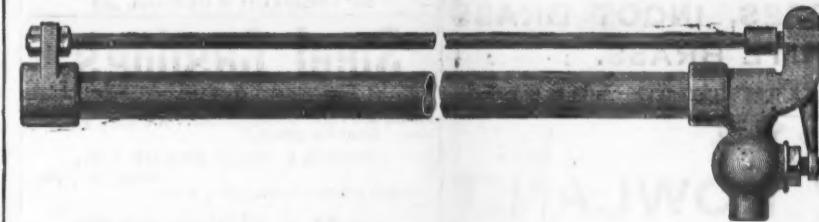
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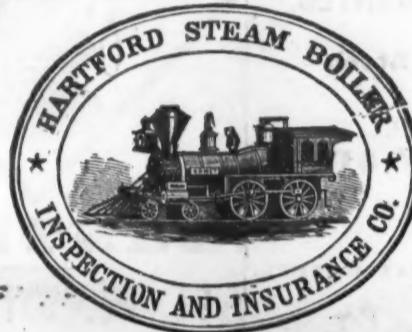


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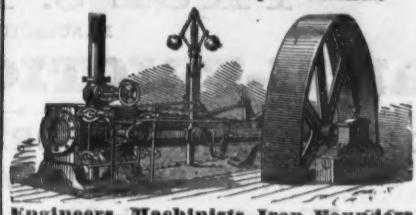
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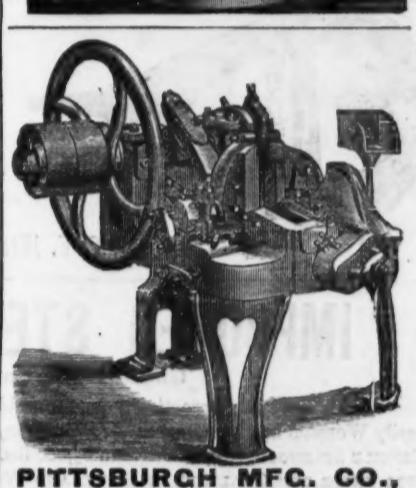
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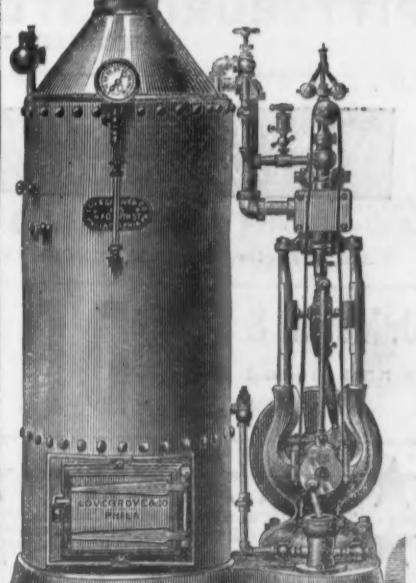


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